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Dear Fellow CSI Members,

"Teachers need to integrate technology seamlessly into the curriculum instead of viewing it as an add-on, an afterthought, or an event."

– Heidi-Hayes Jacobs

“We need technology in every classroom and in every student and teacher’s hand, because it is the pen and paper of our time, and it is the lens through which we experience much of our world.”

– David Warlick

The theme for the Computer Society of India (CSI) Communications [The Knowledge Digest for IT Community] June, 2017 issue is ICT in Education. The need of the hour is to embrace technology to make learning more engaging. Because when students are engaged and they are interested, that’s where learning takes place. ICT in Education opens new vistas for expanding the educational footprint in India, where there is a dearth of faculty and infrastructure in many areas.

We are honored by contributions by doyens of computing in India. In Expert Speak, Dr. Srinivasan Ramani, Fellow and Past President, CSI has written a thought-provoking article on Why ICT has not set the Indian Education World on Fire. Prof. V. Rajaraman, Fellow and lifetime achievement awardee of CSI, who is considered as the father of computer science education in India, has contributed to Technical Trends in his scholarly article on Information Integrity. Also CSI Past President and Fellow, Mr. Salish Babu and Mr. Don Hollander, Secretary General of the Universal Acceptance Steering Group have predicted a technology direction in “Universal Acceptance: Towards A Local Language-enabled Internet”.

Dr. S.S. Sane in Expert Speak has provided a valuable pointer for students and fresher professionals on Lessons from Layoffs and Future of IT Industries/

In this issue, there are 2 Cover Story articles. Krishnasheer Achuthan, Rakhi Radhamani, Dhanush Kumar, Nijn Nizar, Bipin Nair and Shyam Diwakar have showcased a flagship project of Ministry of Human Resource Development (MHRD)’s National Mission on Education through Information and Communication Technology (NME-ICT) in “Design and Implementation of ICT Based Virtual Labs for Laboratory Skill Education”. Sapan H. Mankad has also provided an overview of Effective use of ICT Tools for improving Education scenario.

In Research front, we have “Assessing Efficacy of Question and Answer Services: A Comparative Study” by Anudeep Vishwakarma and T. Arunkumar; the research helps us to access right information at the right place and at the right time.

In technical trends, we have showcased another contribution. Dheeraj Mehrotra gives a nice commentary on "The IT-Oriented Classroom!".

Other ICT in Education articles provide us information on various tools, trends, applications and state-of-the-art. The contributors are M V S Peri Sastry, Jibitesh Mishra & Sasmita Pani, Md. Shams Raza, S. Durga Bhavani & K Pavan Kumar.

This issue also contains Crossword, CSI activity reports from regions, chapters, student branches; calendar of events and Call for Papers (CFP) for various CSI conferences and journals.

Another tribute to Prof. Harry Huskey, a computing pioneer and founding father & Honorary Fellow of CSI by Gio Wiederhold. Bijoy Chatterjee & H. Douglas Huskey is published.

We are thankful to entire ExecCom for their continuous support in bringing this issue successfully.

We wish to express our sincere gratitude to all authors and reviewers for their contributions and support to this issue.

We look forward to receive constructive feedback and suggestions from our esteemed members and readers at csic@csi-india.org.

With kind regards,

Prof. (Dr.) S. S. Agrawal
Chief Editor

Prof. Prashant R. Nair
Editor
Season’s Greetings!

I am happy that our efforts to increase our activities on all fronts are giving results. Communications of CSI is getting published on time and hard copies are being distributed to our validated members. I must thank Prof. Shyam S Agarwal for excellent contribution for promoting quality of CSIC and dedicating to CSI as Chief Editor of CSIC and Prof. Prashant Nair devoting for quality paper publication in CSIC issue and doing an excellent job of Editor, CSIC. A team of Sr. Life Members are efforts in Editorial Board of CSIC are remarkable.

Our Sr. Life Member & Research Professor J K Mandal, deserves our appreciation for bringing out the Journal of Computing after a lapse the about two years. The issue published in soft copy form mainly consists of invited papers. We invite researchers to contribute their papers to this Journal.

The next issue of CSI Adhyayan is going to be published very soon. CSI’s Sr. Life Member & Research Professor S Prakash has already selected some papers authored only by the students. I will fail in my duty if I do not thank IPP Dr. Anirban Basu and Hony Secretary Prof. A K Nayak for helping me in constituting the Editorial teams of CSIC, CSI Journal of Computing & CSI Adhyayan.

IPP Dr. Anirban Basu has been writing to all Chapter Chairpersons to take advantage of CSI’s becoming an REP of Project Management Institute (PMI) and organize PMP trainings for professionals. We have also identified from our members PMP trainers. The list will be made available soon.

Selection of student coordinators RSC and SSC are in the final stages and the list will be announced shortly.

Vice President Dr. Gautam Mohapatra has taken the responsibility of improving CSI portal and I am sure that under his guidance the CSI portal will have a fresh look and will be more convenient to use.

We are trying to increase our international presence. On May 17 we have signed an MOU with Myanmar Computer Professional Association. We plan to make our relationship with MCPA stronger and have exchange of technical ideas with them. We are trying to initiate relationships with computer associations of Nepal, Bhutan and Bangladesh.

IPP Dr. Anirban Basu was recently invited to SEARCC Executive Committee meeting held at Beijing on May 13-14, 2017. He discussed formulation of a Skills Framework with heads of computer associations of different countries namely Australia, Korea, Taiwan, Malaysia, Sri Lanka, and New Zealand. As per the request of SEARCC EXCO, I am happy to inform you that your society has been given the responsibility of organizing SEARCC 2018. We have decided to organize this prestigious international event at Hyderabad in November 2018 under the organizational leadership of VP, CSI Dr. Gautam Mohapatra.

By working together, we can make CSI better and requesting you to share your valuable comments and suggestions at email id (president@csi-india.org) on how we can improve, and what can be done to serve CSI and you better.

With kind regards

Sanjay Mohapatra
President, CSI

Sanjay Mohapatra, Bhubaneswar, president@csi-india.org
Welcome to CSI Communications Editorial Board

Dr. Bhabani Shankar Prasad Mishra, is working as an Associate Professor in School of Computer Engineering at KIIT University, Bhubaneswar, Odisha since 2006. He has received his PhD degree in Computer Science from F.M.University, Balasore, Odisha in 2011. He completed his Post Doctoral Research from Soft Computing Laboratory, Yonsei University, Seoul, South Korea under the Technology Research Program for Brain Science through the National Research Foundation, Ministry of Education, Science & Technology, South Korea. His research interest includes Evolutionary Computation, Neural Networks, Pattern Recognition, Databases, housing and Mining, and Big Data. He has already published about 30 research papers in refereed journals and conferences, has published one book and edited two books in his credit. He is also acting as an editorial member of various journals.

Dr. Sasikumar M is currently associate director at CDAC Mumbai. Alumni of IIT Madras, IITSc Bangalore and BITS Pilani, he has been with NCST and CDAC Mumbai for 30 years. His current research interests include Educational Technology, and Data science. He has authored around 100 papers, 2 books, and has guided 5 PhD students. He has played active role in over 20 research and development projects.

Dr. Sunil Kr Pandey is Professor & Director at Institute of Technology & Science, Mohan Nagar, Ghaziabad - 201007, UP. He has experience of over 20 Years in Industry & Academia, has published 42 Research Papers, edited 12 volumes of Conference Proceedings/ Journals/ Proceedings of CEO & CXO Meets, delivered invited talks/ conducted sessions in 100+ Seminars, Conferences, FDPs across the country, Chaired sessions in Conferences, organized FDPs etc. His areas of interest & research include Database Technology (Data Warehousing & Data Mining, Big Data & Clouds), Cyber Security and IoT. He has also been a regular blogger and very active in promoting the cause of CSI.

Dr. R K Samanta started his Computer Science career from card punching system on Burroughs 6700 in the year 1977. He was Chairman, CSI, Siliguri chapter. He served University of North Bengal and Vidyasagar University as a Professor of Computer Science during last 33 years. After retirement, he is now currently engaged with Siliguri Institute of Technology as a Professor of Computer Science. He has completed research projects funded by Central Govt. Agencies. A number of students have obtained their Ph.D. degree under his supervision. His research interests are Medical Informatics, Agro-informatics, Data Mining and Intelligent systems.

Dr. R.Subburaj, (Scientist “G” (Retd.) Ministry of Electronics & IT) is currently serving as Professor & Consultant in SRM University, Kattankulathur. His areas of Research are Software Reliability Engineering and Machine Learning. He is the author of more than 50 publications including 7 books.

Dr. Rabindra Narayan Behera is working as Sr. Technical Director at National Informatics Centre, Bhubaneswar. A National Level Speaker on varied subjects including Information Technology. Speaker in Doordarshan in “Gyana Bigyan” on Cyber Security and other IT subjects. Got various Awards i.e. eWorld, endlia, SKOCH Digital Inclusion, Manthan, Information Week Magazine. Felicitated in many forums. His areas of interest & research are on Portal, eGovernance Projects, Cloud Computing and Cyber Security and Artificial Intelligence.

Dr. J. Yogapriya is a Professor of Computer Science and Engineering Department and Dean (Research and Development) at Kongunadu College of Engineering and Technology (KNCET), Trichy, Tamilnadu, India. She is having 15 years of Experience in Teaching, published a technical papers in reputed journals, IEEE conferences, and organized various conferences, seminars, and workshop. She is an Editor in Computers and Electrical Engineering Journal (Elsevier) for “Special issues on Advances in Power System”, and serving as a reviewer for Journal of Computer Science and American Journal of Applied Science. Her current areas of research are Big Data Analytics, Cloud Computing, Image Processing.

Shailesh Kumar Shrivastava is the Head, Digital Government Research Centre, National Informatics Centre, Patna. He has 23 years of Experience in delivering ICT & e-Governance Services and has published more than 17 papers in reputed international Journals of Computer science & Engineering. He is the winner of 3 National Awards for e-Governance by Govt. of India for “Innovative Use of Technology in e-Governance” and winner of 6 CSI-Nihilent e-Governance Awards for various e-governance projects. His current Areas of Interest & Research are Mobile Governance, Image Processing, GIS Modeling, Direct Benefit Transfers, Enterprise Architecture, Artificial Intelligence, Citizen Centric Services, Internet of Things.
On April 9, 2017, the computing world lost one of its pioneers: Harry Douglas Huskey, who passed away at the age of 101. Some of his major contributions were as follows:

- In 1952, the Institute of Radio Engineers (IRE) asked Huskey to organize a computer group, which was called the Professional Group on Electronic Computers (PGEC); this group became what is now known as the IEEE Computer Society.
- He served as vice president of ACM during 1958-1960, and as the organization’s president during 1960-1962.
- He initiated the All Indian Computer Users Group that helped serve as the basis for the launch of the Computer Society of India (CSI) in 1965.
- He worked on the earliest computers such as ENIAC, Automatic Computing Engine (ACE); Electronic Discrete Variable Automatic Computer (EDVAC) and Standard Western Automatic Computer (SWAC), which was the fastest computer at the time.
- He was instrumental in replacing storage tubes with a rotating magnetic drum and downsizing the computer so it could be run by a single person in a regular office, an early conception of the “personal computer.”
- Along with Joe Weizenbaum, he developed and added a package for floating point arithmetic.
- He developed the Navy Electronics Laboratory International ALGOL Compiler (NELIAC) for control applications. That experience provided an environment for his students like Niklaus Wirth to develop versions of Algol, PL360, and Pascal.
- In 1963, Huskey went to the Indian Institute of Technology at Kanpur, supported by the U.S. Agency for International Development (USAID). He brought an IBM 1620 “scientific computer” and recruited faculty from leading U.S. Universities. He also brought 10 leading computer scientists for a week to Kanpur for an advisory conference sponsored by Ford Foundation. Many Indian computer scientists and the information technology (IT) business in India trace their lineage to these efforts.

In Memoriam
Harry D. Huskey 1916-2017
– Gio Wiederhold. Bijoy Chatterjee & H. Douglas Huskey

The IBM 1620 arrives at the new IIT Kanpur site. Harry Huskey commandeered Indian Air Force trucks and helps with unloading the crates.

Benefits for CSI members: Knowledge sharing and Networking
- Participating in the International, National, Regional chapter events of CSI at discounted rates
- Contributing in Chapter activities
- Offering workshops/trainings in collaboration with CSI
- Joining Special Interest Groups (SIG) for research, promotion and dissemination activities for selected domains, both established and emerging
- Delivering Guest lecturers in educational institutes associated with CSI
- Voting in CSI elections
- Becoming part of CSI management committee
Why ICT has not set the Indian Education World on Fire!

Srinivasan Ramani
Fellow and Past President, CSI. Inducted into the Internet Society’s Hall of Fame in 2014.

To the person with a hammer, the world looks like a nail! Hammers are powerful, indeed, and solve some problems fast! Complex socio-economic problems cannot be solved so easily. This article analyses the situation and makes a few relevant observations.

Does ICT make the divide worse?

Every good book creates a divide—between those who have read it and those who have not! No wonder ICT has a similar effect. It makes an existing problem worse—the educational divide. The Human Development Report of the UNDP [1] indicates the number of years of education the adult population of a country has had:

Mean years of education of those above 25

<table>
<thead>
<tr>
<th>Language</th>
<th>Average Years of Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>6.3</td>
</tr>
<tr>
<td>China</td>
<td>7.6</td>
</tr>
<tr>
<td>UK</td>
<td>13.3</td>
</tr>
<tr>
<td>USA</td>
<td>13.2</td>
</tr>
</tbody>
</table>

These figures are, of course, changing year by year and are only approximate indications. Is the year at school in one country equivalent in value to a year at School in another? How much of what is learnt at school is retained and what difference does it make to the quality of life and to the economy? Yes, let us accept that this is a complex topic, yet most of us believe that educational opportunities can, and should, be improved. Many of us believe that information and communication technologies (ICT) can make a significant difference to this effort. The Internet has had a big impact on our learning—yours and mine! However, it has left millions untouched so far as their learning is concerned.

Why does not ICT close the gap? This article presents evidence indicating that the bulk of the Indians prefer to access news, information and knowledge in their own languages, while the content on the Web in these languages is inadequate. Other factors involved include: the bias of schools against use of cell phones in education, paucity of Internet access in schools, lack of skilling in using Internet resources. There is no significant effort to use ICT in schools to close the traditional gaps among student groups. It would be surprising if ICT does not increase the gaps!

The cost of letting students drop out of school

Consider young students dropping out of school at the age of eleven or twelve, after five or six years at school. They will grow up into poorly educated adults and be part of a nation’s society and economy for sixty to seventy years more. This will have an effect over most of this century. The students who drop out will grow up and will acquire their own families and have their children who, in turn, will carry the burden of having poorly educated parents! Correcting any failure in their education during adult life is not easy. Students drop out in large numbers every year after a few years of schooling. What does ICT do to reduce the drop-out rate? What does it do for the unfortunate students who drop out? What does technology do for adult education?

It is worth noting a couple of positive efforts in this direction. Dr. FC Kohli has contributed by using ICT to promote adult education. Widely used technologies such as video lessons and TV lessons go a long way. They communicate a wealth of ideas and truly enrich the listener’s mind. Actor and director Dr. Mohan Agashe has demonstrated how powerful 30 or 60-second video clips can communicate valuable ideas, if they are made by communication professionals. Agashe’s video clips do not merely provide information. They grab your attention and touch your heart, and leave you remembering a valuable idea. We will need to use a variety of such innovative ideas to ensure that learning, formal or informal, continues to some extent in everyone’s life.

India and Bharat

Every good book creates a divide in society, between those who have read it and those that have not! ICT does something similar. Unfortunately, the loss is often that of people below the poverty line and those who live in rural areas. Taking a fibre-optic cable to the village does not make knowledge run down the streets. Access to the Internet from rural areas is no real indication that ICT is being used for education. Most schools, and even colleges, ban the students from taking cell phones to schools, particularly girl students! Why? How much of the bandwidth in rural areas is being used for educational purposes and how much for entertainment? For a detailed discussion on this topic, please refer to [2].

How many rural schools provide WiFi access to their students? How many of them teach the students the skills necessary to use educational resources on the Web?

Language

Apart from these problems is that of language. What fraction of our population prefers to access knowledge and information in English? The readership of Indian newspapers provides some indication of this.

From the Indian Readership Survey

2012 Q4 Data [3], in millions (these numbers are approximate as they report only the readership of the top ten papers in language group)

<table>
<thead>
<tr>
<th>Language</th>
<th>Number of newspaper readers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hindi</td>
<td>71</td>
</tr>
<tr>
<td>Other Indian Languages</td>
<td>62</td>
</tr>
<tr>
<td>English</td>
<td>19.7</td>
</tr>
</tbody>
</table>

Content in Indian Languages

The Wikipedia gives some statistics of articles in different languages [4]. Numbers reported in this paragraph are as of May 19, 2017. The total number of articles, irrespective language, is 44.7 million. Thirteen languages each have
a million articles or more. Hindi ranks 55th in this list, with 119,378 articles. Tamil ranks 59th in the list, with 102,855 articles. The other Indian languages have significantly lower number of articles.

W3Techs reported that 51.7% of the one million most visited websites [Let us call them “the top million websites” here] had their home pages in English [5]. Eight other languages were used on the home pages of at least 2% the top million websites: Russian, Japanese, German, Spanish, French, Portuguese, Italian and Chinese. None of the Indian languages are used by even 0.1% of the top million websites.

Again, the statistics above provide only partial information. Readers can read Wikipedia articles and websites in their own languages to see how readable they will be for the average Indian with 6.3 years of school education.

Comments on the tragic situation of Indian language content

There are 0.1% home pages among the top million websites in the Latvian language, though Latvia has a population lower than that of Kozhikode[6]! In comparison Bengali, which is spoken by more people in the world than the Russian language, does not have 0.1% of the top million webpages. Does this not require some discussion?

The importance of Indian languages has been recognized and they have been given their rightful place at the state level. Day to day administrative matters and law and order machinery use the language of the majority in the state. They play a central role in the local culture. Language is also used as an instrument of identity, for instance in job reservation for those who know the official language of the state.

What has been lacking is a focus on science, technology, engineering and mathematics (STEM) education in local languages. Students interested in the STEM subjects gravitate to English medium schools if possible. Students who drop out of school after six or seven years of education are more less denied an opportunity to pick up new knowledge in these areas during their lives. In addition, well paid jobs usually require at least 10th Standard level of knowledge in STEM subjects. So, those educated in their mother tongue are handicapped in competing for these well paid jobs.

Those who take the English medium option rarely try to write for the public in their mother-tongues, particularly on STEM subjects.

Visits to the nearest public library (usually funded by the state government) are revealing. Approximately 70% of the book buying budget is reserved for local language books. Their purchase decision is centrally, and includes very few STEM books. Novels and historical books account for the bulk of the purchases.

The alternative to improved focus on STEM education in Indian languages is to wait for the slow growth of English. Someday most Indian students would be proficient in one or two Indian languages as well as in English. This would solve the language problem! However, I suspect it will not be before the year 2100 CE! Meanwhile we would have written off the future of half of the population during two generations!

IITs and making chapattis by hand

There have been a few bright spots in the field of ICT and education. A well-prepared lecture, delivered by a good lecturer, and recorded as a high-quality video is a valuable educational resource. Project NPTEL [7], funded by the Ministry of Human Resources, supported Indian Institutes of Technology to create a very impressive set of video and web based courses. How lecturers in engineering colleges use them is worth monitoring. The concept of flipped classrooms involves the students viewing a relevant video or videos as per announced schedule, ahead of meeting the teacher in the classroom and taking a quiz. The classroom is used primarily for interaction between the teacher and students. The requires a higher level of confidence on the part of the students as students may raise unexpected questions and doubts. It also demands skills to manage the class, keeping the attention of the students and encouraging them to participate. How many of our teachers do this well? How many of them find it easier to do the equivalent of making chapattis by hand instead of by machine – delivering a traditional one-way lecture from notes?

Postscript: I would like to end by discussing a few positive steps we can and should take.

Professionals in ICT must recognize that people like us are part of the problem. Most of us do not have the skills to write well for the public in Indian languages on STEM subjects. If we could each write three or four Wikipedia articles in our mother-tongue in 2017, there would be a dramatic increase in content in Indian languages!

Our professional societies should make their own contributions. For instance, the student magazine Adhyayan is published by the Computer Society of India (CSI) only in English. CSI should also publish a Hindi version. Government grants should be sought for the additional expenses involved. We should extend this effort to any other Indian language if the concerned state government is willing to contribute.

The same project can also attend to the possibility of creating freely available e-books in Indian languages in the computer field. Doing this with adequate care to maintain high quality is not easy, but the effort is worth making.

References:

Mean years of schooling (years), http://hdr.undp.org/en/data


About the Author

Sriniwasan Ramani, Past CSI President and CSI Fellow, has served as the founding director of the National Centre for Software Technology, now merged with CDAC. He was inducted by the Internet Society into their Hall of Fame in 2014. He has also served as the first director of Hewlett Packard Research Labs, India.
Lessons from Layoffs and Future of IT Industries

S S Sane
Vice Principal, Professor and Head of Computer Engg., K K. Wagh Institute of Engineering Education & Research, Nashik
Regional Vice President, Region VI (Maharashtra & Goa), Computer Society of India

IT industry is in news for last few days. There are reports of layoffs by many leading IT Industries creating lots of fear, stress/tension in IT professionals as well as confusion amongst younger minds who are planning to make their carrier in IT. However, if one looks back, it is not for the first time the companies declared layoffs. In fact such layoffs are likely to occur in future too. From the past experience from such layoffs, one can say that current crisis is a temporary phase and the IT industry will make progress.

Indian IT professionals have not only dominated the IT industry worldwide but also received worldwide acceptance and respect and they will continue to dominate in future too. However, fresh employees need to understand history of the IT industry and changing business environment to ensure that they remain productive and not become victims of such layoffs.

History of IT Industries

In the initial era of computing, there were a few software companies and were mostly product companies who designed and developed operating systems, compilers and database software. After invention of desktop personal computers by hardware industries, many application software in variety of domains such as inventory, payrolls, accounting etc were developed. Newer and powerful programming languages and their IDEs (Integrated Development Environment) were developed by these product industries. The graphical user interface provided by the operating system in 1990s really helped penetration of computing applications in almost all the domains and software companies could develop new GUI based products as well as integrate isolated applications in one single product package. This also helped many software companies to start their business mainly in the form of services by migrating or porting existing text-based applications to GUI based systems. Widespread use of the Internet was the second biggest IT revolution after the 1st revolution of desktop computers. Helped computing to further grow and penetrate in day-to-day activities and provided opportunities for both product as well as service industries. Technology innovations in both hardware and software domains gave tremendous boost to service industry, also called ITES (IT Enabled services) and contributed for major source of revenue for service industries.

Availability of powerful but low cost hardware device coupled with mobile revolution gave further rise to unlimited applications and services, many of them which were thought impossible. The mobile revolution was followed by cloud revolution and also provided opportunity for both IT product and service industries.

In the past three decades, many of these industries were working on implementation of readymade solution provided by the clients to solve their issues or problems. Services mainly were implementation, porting or migration services. For last so many years, the IT Service industries were involved in migrating existing applications from desktops to web-based applications, or porting applications from one operating platform to other or from one programming language to other and so on. Another example would be the migration of existing applications to cloud environment. In all such projects, the task was implementation of the known solution and was relatively easier. The service industry needed to hire enough manpower, and trained them on specific skill set as per the projects at hand and delivered the implementation as per the pre-decided deadlines.

The major difference in product-based and service industry was that service industries were given problem with known solutions and thus these industries mainly worked and will also work in future as implementation agencies that need fix set of skills (although varies across domains) while product based companies need innovations to design and develop new products. The products developed by IT and allied Industries give birth to services and future products.

The Dilemma for Fresh IT professionals

The Fresh IT professionals always face a dilemma about selection of their carrier between Product-based and service based companies. While these professionals are always in favor of product based companies for the sake of satisfaction of applying their innovations and talents, but find limited opportunities as till now large numbers of opportunities were available in service domain providing huge revenue. Many experts feel that in days to come, there would be emergence of large numbers of product industries.

Importance of Product industries

In days to come, IT Industries are expected to solve problems without known/readymade solutions in variety of domains such as infrastructure, energy, environmental pollution etc. Problems being inherently interdisciplinary in nature need expertise from different domains and need innovative approaches. For example, companies are expected to solve the problem of traffic congestion in metros and cities with innovative solutions that were not tried and tested before. Road widening, use of dividers or building flyovers are tried and tested solutions and as witnessed today these solutions simply do not help in solving the problems. We need to think of innovative solution in such a way that many people do not need transportation, so they will not be on roads. The solution off course need to ensure all of us still could carry out the tasks that we do today and still could prosper in future. IT infrastructure is already allowing people to work from home.

Future of IT

Having seen the history of IT industries that underlines importance of product industries, following trends are expected.
Although, one may experience some reduction in revenues from services, the service industry will continue to exist.

Many product industries will emerge to provide solutions to solve interdisciplinary problems from different domains. Industries will focus on research in emerging areas and may set up their own research units independently or collaborate with Universities and colleges. Apart from other skills, product industries would focus on product design skills as well.

Technology such as SMAC (Security, Mobility, Analytics and Cloud) as well as IoT, machine learning, deep learning, Artificial Intelligence etc would continue to dominate the future resulting in many new products and services.

The industry will witness layoffs in future also

Lessons to learn
With continuous changes in the market/business environment, layoffs will occur in future too. There are of lots of lessons to learn from previous and the current layoffs. Such layoffs are the reaction of the industries to changing market/business scenario due to technology changes or political decisions or social factors. The current layoffs have roots in political decisions in the western world. Industries also use such opportunities to discontinue non performing employees as well as excess manpower recruited. Thus employees need to carry out self analysis periodically to ensure that they remain useful or productive for their organization. After all, no IT industry or for that matter any industry or organization would like to loose good employees. “Good” employees are those who have
  • Sound fundamental knowledge, domain knowledge and required technical skills
  • Innovative minds, research attitude, excellent drive and initiative and team spirit
  • Flexibility, adaptability, life-long learning skills and Soft skills
  • Indian core Values such as Honesty, hard working, integrity, sincerity and
  • Sense of belongingness
Irrespective of layoffs, “Good” employees will never loose their jobs. Employees, fresh or experienced, will need to acquire such skills. Industries will have to come out with newer and accurate mechanisms for performance appraisals. The Universities and Institutes will have to work hand-in-hand with industries to inculcate these skills on campus itself.

Memorandum of Understanding between Computer Society of India (CSI) and Myanmar Computer Professional Association (MCPA)

Signed on 17th May, 2017 by Mr. Sanjay Mohaptra, President, CSI and Mr. Thaung Su Nyein, President, MCPA to provide wider social and economic progress, for ICT advancement, for spreading computer education and research, for dissemination of technological developments and to facilitate collaboration and co-operation among their members.

MCPA, established in 1998 is the largest ICT professional association in Myanmar operates under the guidelines of Myanmar Computer Science Development council, chaired by a Union Minister and Myanmar Computer Federation.

The objectives of the MoU effective for 2 years from 1st June 2017 are to approve in principle for endorsement and sharing of services, publications and qualifications including:

– Publications, product, knowledge dissemination workshops and other services
– Jointly-organized conferences and similar events
– Exchange visits of computer scientists and engineers
– Joint projects in advanced technologies
– Discounts in registration fees for attending events organized by CSI and MCPA
Design and Implementation of ICT Based Virtual Labs for Laboratory Skill Education

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To augment laboratory education quality, India’s Ministry of Human Resource Development (MHRD)’s National Mission on Education through Information and Communication Technology (NME-ICT) launched virtual laboratories project to enhance university and college practical skills. Online labs aim to provide an advanced training environment for teachers and students for solving some of the geographical, social, and economic challenges faced by science and technology education, especially in India. As a vision to provide sustainable laboratory skill education, virtual labs were developed and deployed as a supplementary e-learning material. Pedagogical studies were carried out among teachers and students of various universities from urban and rural areas of India, and indirect data were collected from online users. This paper reports on how virtual labs were perceived in improving teaching and learning experiences for providing a better education beyond the limits of a physical laboratory setting. Paper analysed effectiveness of virtual labs in comparison to traditional labs and analysing its role in providing equity in education (bridging the urban and rural gap in education). Direct and indirect feedback indicated both teachers and students, especially from geographically remote institutes, employed virtual labs education in the role of laboratory skills via simulations and animations. With appropriate design incorporates, the ICT-based labs can augment student’s performance in blended education and reduce teaching time.

Keywords: Virtual Laboratories, Sustainable Education, Hands-on Workshops, Feedback

Introduction

Rapid advances in computer technologies and relative increase in internet connectivity has transformed Information and Communication Technology as a building block to meet the modern societal needs, mainly in business, industry and governance (Adesote & Fatoki, 2013). Several countries include the knowledge of computer skills as a core for education purposes, a social activity including teaching and learning (J. Augustus Richard, 2015). Implementing ICT in education system has been a multifaceted process, as it integrates technology with the needs of education institutes such as curriculum design, instructor competency, among others to improve efficiency and effectiveness of present education system(Tinto, 2002). According to British Council executive summary on Indian School Education System that there were more than 1.4 million schools, approximately 227 million students enrolled for higher education in various institutes(Ghosh, 2014). In such a situation, factors that retard sustainable development in the present education system, needs to be modified to attain the socio-economic growth of the country(Ozturk, 2001).

The United Nations General Assembly, in its 57th meeting in December 2002, proclaimed the UN Decade of Education for Sustainable Development, 2005-2014, ‘emphasizes that education is an indispensable element for achieving sustainable development’. Studies indicated that a major challenge in achieving the vision of promoting accessible education is how to mitigate information and knowledge gaps between different parts of the world (Achieving Sustainable Development and Promoting Development Cooperation, 2008). In India, literacy is the main foundation for social and economic growth, thus the need of sustainable development in education is at most priority (Author, 2014). The rapid advancement of digital media and information in the 21st century overwhelmed the role of ICT-based education in developing nations(Garrison & Anderson, 2003). UNESCO reports also suggested ICTs have a major role in contributing to universal access to education, bringing equity in education and delivering high quality learning and teaching materials. Government policies and initiatives for promoting ICT-based education, has begun enabling education in rural India. Still the utility of ICTs have not diffused to needed levels in rural population (Roy, 2012).

Students pursuing higher education relate to issues with resources such as
trained teachers, adequate lab facilities and maintaining lab infrastructure to run the experiments on a frequent basis (Author, 2012). Meanwhile, E-learning and open-learning programmes have been gaining popularity as massive online courses in education institutes in several developing and under-developed countries (Author, 2014). It has been shown to provide an anytime-anywhere learning scenario, irrespective of the geographical and economic barriers facing in the current education system (Author, 2011a).NPTEL [http://nptel.ac.in/], OSCAR [http://oscar.iitb.ac.in/oscarHome.do],NKN [http://www.nkn.in],A VIEW(http://aview.in/), Online Labs for schools, (http://www.olabs.co.in/) are some good examples of e-learning and virtual labs in India.

India’s Ministry of Human Resource Development (MHRD), the government organization, under National Mission on Education through ICT, launched virtual labs project to provide laboratory-learning experiences to university students across India who may not have access to adequate laboratory time, facilities or equipment. The virtual laboratories are built on a common platform and are freely accessible via internet (Author, 2011b).

The aim of the paper is to suggest the role of ICT-based virtual laboratories in sustainable development of education in rural and urban education institutes in location with socio-economic challenges. The paper also focusses on analysing benefits of virtual labs, role of virtual laboratories in providing temporary equity in education among rural and urban institutes, and distant monitoring of education with ICT.

Methods
Laboratory modules were designed with software technologies to get a realistic virtual environment for learners thereby providing a first-hand practical skills for understanding scientific experiments and data analysis.

Developing virtual labs
Primary reasons for adopting virtual labs in education have been due to the creation of a user-friendly platform to develop and deploy the labs and the initiative to develop the platform as an Open Educational Resource (Author, 2011b) in learning.

Virtual animations
Computer animations using 2D or 3D graphical scenes were displayed in a sequential way(Jancheski, 2011). Animations can either be classified into expositive (Xiao, 2013), where learners watch the expository content on computer screens,examples include gram stain technique and Detection of Adulteration in Milk(land interactive, where the learners interact with the animation contents [examples include, Blood grouping experiment and Estimation of Iodine Value of Fats and Oils ]. For more examples, see http://vlab.amrita.edu).Visual modelling of experimental scenario was achieved by 2D Adobe Flash or JavaScript/HTML5 based animations reducing imagery complexity of learners by modelling process. This delivered a high degree of reality to virtual labs with their similarity and close appearance to a real lab (Author,2012).

Virtual Simulations
Simulations were designed using simple mathematical equations [mathematical or empirical model] that provide quantitative and hands-on experience to each experiment for supplementing physical laboratory skills and practices. With simulated models, learners were trained towards optimization (varying parameters), calibration [use of analytical instruments] and familiarisation [use of lab utensils] of a laboratory module. Experiments were designed using simple mathematical equations, as in Population ecology labs (Leslie Matrix Model) and complex equations as in the case of Neurophysiology labs (Hodgkin and Huxley Model). Learners can provide limited inputs and were able to decide/generate graphical results accordingly. Measurement-based labs were another category, where data to be analysed were provided to the learners by graphical means or by microscopy images. In Biological Image Analysis virtual labs, image processing techniques were used to analyse and quantify image data from wet lab experiments from biosciences disciplines.

Remotely controlled labs
Remote triggered [RT] experiments provide access to real laboratory equipment which connect users with public and private networks. It provides training skills to learners through distant learning, who lacks hands on experience due to accessibility, cost and location(Azad, Abul KM, 2011). Since remote triggering the equipment/complete lab set-up was too difficult, pre-designed sections of usable input space were selected as controls for distant user interaction. The remote lab set-up was connected to DAQ (Data Acquisition) device interfaces between the server and the remote devices, by receiving and sending signals between remote equipment and server via LabVIEW. Remote experimentations were connected to the lab server, which receives requests from distant users over the internet. Device commands were later send to the equipment hardware through DAQ. Service broker functions to communicate with the server and distant users. Experimental outputs were notified to the users through service brokers. Remote access was configured to a single user at a time (Author, 2016).

The approximated cost for proprietary hardware with integrated LabVIEW software increased the economic issues with implementing remote labs as distant modules. The proprietary designs were replaced with the Free and Open Source Software (FOSS) implementation for introducing new methodologies and skill education in laboratory training. Here, Raspberry Pi was used as controllers and JAVA-based webservice for communication purposes. If a user access the remote device, a http GET request was sent through the flash backend of the UI to the lab server. JAVA web server then gave command to raspberry pi and experiment was triggered remotely. Output of the experiment was sent via http RESPONSE to the existing user interface as xml,JSON etc.Kerberos-based single sign on was employed for virtual and remote labs, and the individual sign-in were used as a metric of lab usage (Author, 2016).

Deployment of virtual labs
The ability to develop an automated deployment environment is the key aspect of virtual labs. CAP-VL with an N-tier architecture, a highly scalable
platform, has been developed to enable deployment of virtual labs. It allows various institutions to collaboratively design, develop, assemble, re-use and manage virtual lab contents. VLCAP supports both local institute cloud model and the hosted model enabling content presentory distribution and usage by multiple institutions [Author, 2011b].

Diffusion of virtual labs—Field trials

Diffusing virtual labs for enhancing university education in India’s rural and urban areas was achieved by initiating field trials (workshops) at different science and engineering institutes (Fig.1). Nodal center program, (colleges directly advised by the project and used virtual labs as a part of their regular curriculum) was also initiated, that allows other institutes to use virtual labs for the benefit of their students and teachers and provides a platform for everyone to contribute towards the future development of Virtual Labs. Such institutes were provided with demonstration of experiments, interactive discussions, workshops using learning management system, and online support for hands-on session. Via field trials, we tested the following criteria for analysing the role of virtual labs in supporting laboratory skill education.

Analysing role of virtual labs beyond geographical barriers in skill education

Analysis of virtual lab usage in classroom education (both teacher perspective and student perspective) was evaluated based on a direct written feedback (from workshops during 2014-2016) based on the Technology Acceptance Model (TAM) and IEEE Open Education Resources (OER) surveys. A total of 850 teachers and 2750 students participated in this study. Table 1 shows the assessment questions included in the feedback questionnaire.

Analysis of Cost Effectiveness of Virtual Labs

Analysis in terms of preference and usage of virtual labs among professors from nodal centers were studied based on both verbal and written feedback.

Table 1: Direct feedback questions for usage assessment among teachers and students

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Feedback questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>Virtual labs were used as a supplementary material to enhance physical laboratory training.</td>
</tr>
<tr>
<td>Q2</td>
<td>Virtual labs cover the entire syllabus in the curriculum material of your university.</td>
</tr>
<tr>
<td>Q3</td>
<td>The repeatability of each experiment in virtual labs at any time anywhere mode made this online educational tool easily adaptable.</td>
</tr>
<tr>
<td>Q4</td>
<td>The results of the experiment were easily interpreted.</td>
</tr>
<tr>
<td>Q5</td>
<td>Virtual labs imitate experiments like performing in a real lab with respect to materials and results.</td>
</tr>
</tbody>
</table>

From teachers, data was collected on the basis of their experience in using virtual labs in their classroom based teaching. Participants responded by marking yes/No to the respective questions of analysis [Table 2]. For Q5, different aspects given by each participant is tabulated.

Analyzing Role of Virtual Labs as an Online Education Platform

We collected and evaluated 22000 independent online feedback from VLCAP portal. Online users submitted TAM and OER-based responses on the use of virtual labs in their learning process.

Table 2: Direct feedback questions for nodal center coordinators

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Feedback questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>Do you think virtual labs can be used as a substitute for class room presentations in the teaching?</td>
</tr>
<tr>
<td>Q2</td>
<td>Virtual laboratories provide new inventions towards education to meet the requirements of a regular classroom teaching.</td>
</tr>
<tr>
<td>Q3</td>
<td>Do you think virtual labs can be used as a laboratory material for concept-based and equipment based learning?</td>
</tr>
<tr>
<td>Q4</td>
<td>ICT will bring a paradigm shift in the current education that benefits the society.</td>
</tr>
<tr>
<td>Q5</td>
<td>Post the current issues facing in your institute to provide quality education.</td>
</tr>
</tbody>
</table>

Table 3: Online feedback questions for remote users

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Feedback questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>Would you suggest using virtual lab as a reference material for laboratory education?</td>
</tr>
<tr>
<td>Q2</td>
<td>Virtual lab is an effective tool to learn usage of costly equipment and reagents.</td>
</tr>
<tr>
<td>Q3</td>
<td>Virtual lab helps to learn step-by-step procedure of an experiment without the help of an instructor.</td>
</tr>
<tr>
<td>Q4</td>
<td>Virtual lab helps to make experimental calculations easier and to analyse and interpret results.</td>
</tr>
<tr>
<td>Q5</td>
<td>The technical support from virtual labs is satisfactory in improving education.</td>
</tr>
</tbody>
</table>

Global usage of virtual laboratories were analysed by monitoring user registrations in the year 2012, 2013, 2014, 2015 and 2016.

Results

Virtual Labs- A Substitute for
Laboratory Education in Challenged Institutes

A significant percentage of teachers and students indicated virtual labs as a supplementary education tool for their learning/teaching purposes (Fig. 2).

Cost-Effective Virtual Labs Supplements University Education – Sustainable Development in Education

The effectiveness of virtual laboratories depends directly on the cost factor needed for its implementation and deployment. When compared with a physical laboratory setting, advantage of virtual laboratories is that only a one-time investment is needed for virtual labs project development (software cost and material cost), laboratory maintenance (hardware cost, energy cost, and cost of lab equipment and other resources) and online delivery (computer with internet connection and other network devices). In physical laboratories, the cost for building, furnishing and maintenance of lab equipment, cost of consumable reagents and chemicals were relatively high. 60% of the nodal coordinators were from rural area while 40% were from urban places. Figure 3 shows the responses from teachers during the feedback analysis.

Discussion

In this paper, we discussed development and deployment of virtual labs as an online laboratory material. For diffusing virtual labs organized workshops for students and teachers were conducted across various places in India and direct feedback data were collected for analyses. We also included online feedback collection to analyse the role of virtual labs in bridging the gap between urban and rural users, and to empower those who have remained untouched by the digital revolution. These labs are student-centric as they can easily access it outside of regular classroom hours. Student users also reported that varying parameters provided in the simulation-based experiments provided them to explore the experiment under different conditions enhanced their skills in lab training. The teachers from nodal centers reported that in addition to being teaching aids, virtual labs have been known to allow economic benefits also. Some institutes have not been able to afford the cost of some lab equipment. While usage patterns vary, responses from students, teachers and online users relating the ability to learn experimental process without an instructor supports virtual labs may be an autonomous learning tool for distance education. Also, studies indicated that virtual and open learning initiatives support for laboratory skill education but cannot replace existing educational institutes or hands-on laboratory practices. Evaluation of virtual lab usage suggested the lab as a cost effective supplement for laboratory education. Analysis also suggested the usage of virtual labs beyond the boundaries of physical laboratories. Global usage has grown to over 240000 registered users with a steady increase of new users from 2012-2017 on virtual lab platform. Although virtual labs were found to be an add-on solution for geographically challenged institutions, limitations in facilities, ICT issues, inadequate power supply and hardware issues derailed rapid diffusion of such online repositories.

Conclusion

Virtual labs are effective for complementing laboratory education

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**Fig. 2**: Virtual lab usage teachers (top) and students (bottom) from India’s rural and urban areas (see Table 1 for feedback questions)

**Fig. 3**: Virtual lab as a curriculum material (see Table 2 for feedback questions)

**Fig. 4**: Online usage of virtual labs (see Table 3 for feedback questions)
and as teaching material for teachers who have limited access to laboratory facilities in their institutes. Further studies on learning behaviour may be needed to distinguish cognitive learning modes on distance learners, and to understand teaching presences in a virtual scene and in traditional blended learning environment.

References

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Effective use of ICT Tools for improving Education scenario

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"Education is the process of transforming human being into being human". During my journey as a teacher, I have carried out various experiments in my classroom sessions. Use of tools such as course blog (Wordpress), Moodle, Google Classroom, NPTEL video lectures, Spoken Tutorials, Virtual Labs is common practice nowadays. In this article, I have discussed about some tools which can enhance teaching learning and may help the teachers to inculcate interest in students. It is the teacher’s responsibility to use effective mechanism to bring interest in his class by introducing various innovations, and use of ICT tools can be one of the best solutions.

Characteristics and Responsibilities of a Teacher

A teacher should lead by example by motivating his students. Fig. 1 depicts typical levels of teachers.

A Level 0 teacher is like a professional, whose task is just to deliver lectures in time, mainly using Passive (traditional) learning approach and focus on syllabus completion. Gradually moving up in the concept hierarchy, the approach of teachers towards inculcating Learning and Research aptitude into students become prominent. An effective teacher is the one who makes the classroom environment interesting with the help of ICT tools. Level 2 teacher always relates the theoretical aspects with real applications and tries to motivate students to think in that direction. Scholarly teachers are those who focus on contributing their knowledge in Research community and share it with the world. Finally, top level teachers are those who not only technically, but also pedagogically seek to bring innovations and changes into Higher Education.

A teacher should not merely be an instructor, but he should also possess an all-rounder ability. Nowadays, teachers need to transform themselves from conventional classroom settings to open and participatory, active learning scenario. Moreover, they are also expected to work not only as guide, but also as facilitator, mentor, helper, leader, inspiration and role model for students. A teacher should be ideal for his students and he must lead to them towards honesty, ethics and values.

Fig 1: Levels of Teachers [1]

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Fig 2: Responsibilities of a teacher

A good teacher is expected to be rich in terms of values and should not post any negative effect on the students. His objective should be to perform thorough literature review and identify the best material, simplify it as per the type of students, see to it that the quality of the material is utmost, and then deliver or distribute it among students. Fig 2 describes the responsibilities of a good teacher.

How to sustain interest of students during the entire session?

Students’ attention span in current generation is merely 7-10 minutes. Hence it is extremely difficult to sustain students’ interest during a one hour session. This is hardly possible unless we use some techniques to engage students such as role plays, games and other warm up exercises. This has to be done by connecting students at the beginning of the presentation. Further, we can also ignite curiosity into students’ mind by presenting a central theme of the topic which will initiate thought process into brains of the students. I often conduct a Quiz in the initial few minutes of the session by dividing the class into two or three teams and let them respond to small questions and recall the concepts of past sessions.

Innovation in Education can be brought through three different types of approaches.

1. Course centric: MOOCs nowadays...
have drawn attention of the entire world where one can avail the facility of obtaining education from reputed international institutes and universities. They are also a means for remote, distant education as well as online learning.

2. **Teacher centric**: The most important stake holder of Teaching-Learning process, the teachers, should be up-to-date in their field of expertise, and have to continuously keep participating in well-recognized training programmes, workshops etc. to meet the requirements of the day.

3. **Learner centric**: The classroom learning can be made interesting by introducing a plenty of games, ICT tools and other innovative practices which may help students interact with the teacher as well as their peers also.

Neither a subject is boring, nor a student is dumb; it is the ability of a teacher to transform the subject into interesting one! And ICT tools can be very effective in doing so.

**Use of ICT tools**

Following are some of the innovations which I have attempted over the time, and I have obtained reasonable success in these experiments.

1. **Conducting regular surveys using SurveyMonkey**
   - **A. Pre-course Survey** is used to test whether the students possess the sufficient background and prerequisite knowledge for the particular course, or no. For example, higher semester courses such as Digital Signal Processing, or Simulation & Modeling demand the preliminary knowledge of the concepts of Probability and Statistics, which is already covered in one or two courses during their earlier semesters.

   The results of this survey enable the teacher to analyse the technical level of students, and decide the flow of lectures accordingly for subsequent sessions.

   **B. Mid-course Survey** is often missing in traditional scenario. Its biggest advantage is to detect students’ response and expectations well in time (usually after 2-3 weeks of the semester commencement), meet those expectations and serve them better so that learning does not suffer.

   **C. Post-course Survey** helps to improve the process in the upcoming versions of the course (in the next semester) since it is collected from students at the end of the semester. It serves as a Course Satisfaction Index.

2. **Engaging students through online discussion forum Piazza**

**A Brief History**

The story behind inception of Piazza is very interesting. One student from IIT, Pooja Sankar felt that it is always difficult and embarrassing for some students to raise questions and ask clarifications of doubts during the class (which may be due to fear factor or any other reason). To help such students, later, she developed this amazing tool and it is used by many prestigious universities globally.

I would like to highlight some features of Piazza which I found most useful.

- The instructor/teacher can post any important announcement here and all enrolled students can be automatically notified through email. In short, it may work as a group of users.
- Different threads can be created for a single topic discussion.
- If some student does not want to reveal his identity (hesitating in asking doubt in front of peers/in classroom), then he may post his doubts anonymously.
- Posts can be moderated by the instructor.
- Posts can be categorized into customized folders by the instructor based on their contents such as Homework, Lab, Assignments, Exam etc.
- One can upload file, video, image or link in the post.
- One can generate polls and collect information.
- LaTeX support is available!
- Users can also use private posts if they do not wish to send posts to all.
- One can also see the class activity summary report.

Android and iOS apps are also available for Piazza and as per my

![Fig. 3: Piazza Usage statistics report](image-url)
communication with their user support operations staff, they are planning to extend the services to Windows phones as well. Thus, Piazza is a wonderful tool which supports teachers mainly by providing the facility of online discussion forums. An instructor can configure a Piazza class with some settings, and enrol students and/or other instructors or TAs to the class.

Fig. 3 is a snapshot of automatically generated usage statistics report of Piazza for my class 2IT422 Data Engineering during 2013. Some of the responses from students on the Sessional exam question paper for another course are visible in Fig 4.

3. Socrative
After completion of a session or lab practical, students’ knowledge can be evaluated by a small quiz. This can be accomplished using Socrative.com website. It accepts student responses and prepares a comprehensive report both question wise and student wise for analysis purpose.

4. Padlet
Padlet.com is a website which serves as an e-noticeboard, where one can list important points or show difference between two entities by showing their pros and cons etc. This is known as padlet. Exporting such a padlet in PDF form generates a very good document which can be distributed as handout.

Till date I haven’t found a single tool which can offer all the features as listed in Table 1. However, tools with single salient feature are available and are quite useful.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Tool</th>
<th>Salient Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Piazza</td>
<td>Discussion forum</td>
</tr>
<tr>
<td>2</td>
<td>Moodle</td>
<td>Online examination</td>
</tr>
<tr>
<td>3</td>
<td>Turnitin</td>
<td>Plagiarism check</td>
</tr>
<tr>
<td>4</td>
<td>Google Classroom</td>
<td>Assignment Evaluation</td>
</tr>
<tr>
<td>5</td>
<td>Survey Monkey</td>
<td>Online survey</td>
</tr>
<tr>
<td>6</td>
<td>CATME Smarter Teamwork</td>
<td>Peer Evaluation</td>
</tr>
</tbody>
</table>

Conclusion
Learning can be student centric
only if the teacher can transform the traditional learning into active learning through unconventional approaches by making it interactive using some tool. If the teacher is passionate and innovative about whatever he is doing, he will definitely contribute to the development of Teaching Learning.

References
[1] https://shmlive.wordpress.com/2016/02/01/towards-student-centric-learning/

About the Author

Sapan H Mankad is working as an Assistant Professor at Department of Information Technology, Institute of Technology, Nirma University, Ahmedabad. He has a teaching experience of 12 years. His area of interest include Speech Processing, Machine Learning and ICT tools. [CSI Membership No. : I1510512]

National Technology Day Award to Dr. P C Jain, Sr. Member CSI

Dr. P C Jain, Senior Member Computer Society of India and a Scientist with Defence Research & Development Laboratory (DRDL) Hyderabad has been conferred National Technology Day award. Dr. Jain an alumnus of IIT Roorkee, IIT Bombay and BOYSCAST (DST) fellow from Pennsylvania State University USA is an expert in the areas Structural Optimization, Structural Dynamics and Nonlinear Structures Technologies. He has significantly contributed towards the success of various National Projects. Dr. Jain delivered the Technology Day Oration on the topic Aero Structures Technologies - Criticalities and Challenges. Talk focused on Critical Technologies, Methodologies adopted and the resulting robust Products. Technology Day Medal and DRDO Chairman’s Commendation Certificate was presented by Shri MSR Prasad Distinguished Scientist and Director DRDL Hyderabad to Dr. PC Jain.

Mr. MSR Prasad Distinguished Scientist and Director DRDL Hyderabad presenting the National Technology Day Award to Dr. PC Jain, Scientist DRDL Hyderabad

CSI Day Celebrations

Cambridge institute of technology, under CSI-CITECH student branch, organized CSI-Day with an inter-collegiate technical fest on 26th April 2017. The event was inaugurated by Dr. Anirban Basu, Immediate Past President, CSI. There were 7 events organized, Innovative project proposal, Instant programming, IT-Quiz, Hackathon, code-debugging, Mobile app mock-up and paper presentation. 500 students with 13 different colleges participated.
All organizations are now increasingly dependent on computers. Managers, customers, and auditors place implicit trust on the hardware and software of computers. Information system designers have the responsibility to ensure that information systems used by organizations are not corrupted due to accidental errors or intentional mischief. In other words, the integrity of information systems is not compromised. In this article, we define information integrity and point out that it includes not only database integrity and security but also many more aspects such as processing integrity and communication integrity. We emphasize that integrity issues must be kept in view while carrying out systems analysis and design and not after the design process is completed. Organizations must have an information integrity policy encompassing all business units of the organization.

Keywords: Data quality definition, information integrity, information integrity policy.

1. Introduction

All of us are increasingly dependent on computers. Our bank accounts are maintained by computers. Our stock holdings are now dematerialised; paper share certificates have been replaced by data stored in some computers. Every automobile now has several microcomputers controlling the engine, breaks, and other subsystems. Computers control power generation and distribution, communication, aviation, and medical devices. We implicitly trust them. Typically, we see in some documents a statement saying that it is “computer generated and does not need a physical signature”. Although we trust computer based information systems, they are vulnerable. They may be designed poorly with insufficient quality control. There could be accidental errors in data inputs, errors deliberately introduced by disgruntled employees, errors due to incorrect processing, hardware errors, errors in communication systems, unauthorized code changes, inadequate control of error detection and their handling. Carelessness in designing information systems have led to huge monetary losses, loss of lives, and public embarrassment. Many cases of losses by financial institutions are not reported as public may lose credibility. It is estimated that losses run into billions of dollars. We give in what follows some examples of financial loss, loss of lives, and loss of credibility due to poor design.

- Stock traders Knight lost $440 Million within 30 minutes due to the introduction of a new (poorly designed) automated trading software. The software initiated erratic trades in 100 shares affecting the market adversely. [1]
- Air France Flight 447 with 288 passengers and crew crashed on May 31,2009 during its fight from Rio de Janeiro to Paris. It is reported that the on-board computer-based reporting system transmitted several messages regarding the discrepancies in the indicated air speed before the aircraft disappeared. Twenty-four error messages were generated as software systems failed across the aircraft [2].
- On May 10,2014 Wall street stock market index plunged 1000 points and the traders were taken aback. On careful examination, it was found that it was due to a single incorrect key stroke by a trader. The letter B was typed instead of M. Thus, instead of a Million the system used a Billion that caused a ripple effect before the error was realised. The poor design was not to raise an alarm when an unusual trade was initiated [3].
- Closer home on May 3,2017 it was reported that in web sites of some states Aadhaar number along with linked bank accounts of 135 million persons were inadvertently displayed. This was due to carelessness of web designers who should have encrypted this sensitive data before storing in the database and should not have made the information publicly accessible [4].

These are only a few examples. A Google search using the term examples of software failures gives a huge number of cases of space craft failures, air crashes, missile malfunctions, and malfunction of medical devices due to poor software systems design.

It is the responsibility of information systems designers to guard against these risks. There are three separate aspects in ensuring the reliability of information systems of organizations. They are Confidentiality, Integrity, and Availability, often known as CIA.
2. Defining Information Integrity

Chamber’s dictionary gives the meaning of integrity as “entireness, wholeness, unimpaired state of anything, purity”. The meaning of security is given as “safe, assured”. Thus, we see that there is a difference in meaning between integrity and security. We can have information that is safe but incorrect. We emphasise this point as there is confusion in the literature while discussing the integrity and security of information system. They are often used interchangeably.

In the context of Information Technology, we define information as “processed data that enables a person to take decisions or initiate actions” [6]. In other words, data is the raw material which is processed by a program to yield information. Information is thus created for specified use. Processing includes manipulation of data by sorting, tabulation, and other operations carried out by a computer program. Data integrity does not thus imply information integrity. Data integrity is a necessary but not a sufficient condition for information integrity.

In this article, we are primarily concerned with information integrity. There are several definitions of information integrity. One of them is [7]:

“Integrity is the representation faithfulness of the information to the condition or subject matter being represented by the information”

Another definition is [8]:

“Information integrity includes the accuracy, relevance, precision, timeliness, and completeness of information that is accurate, relevant, precise, timely, and complete for a particular purpose and can be termed to be fit for purpose”.

A common feature of the above two definitions is the emphasis on the quality of information. In order that one may use information with confidence to take decisions it must satisfy a number of quality criteria that we discuss next.

3. Qualities of Information

As was pointed out in the last section information integrity requires that information satisfy a set of quality requirements. These qualities are [6]:

- It must be accurate. In other words, it is necessary to ensure that the data used as input to a process is not corrupted and that the processing rules used are correct. This property is sometimes interpreted as reliability of the information provided so that action taken based on it may be taken with confidence.
- It must be complete. In other words, in obtaining the information all relevant data should be used.
- It should be trustworthy. The processing of data should not hide or ignore some vital data that may expose the inefficiency of some individuals or systems.
- It should be timely. Delayed information may not have any value.
- It should be up to date. In other words, it should include all data available at the time of processing. There is a subtle difference between the two qualities, namely, up to date and timely. For example, information provided to a user as soon as he or she asks for it is timely. If it does not include all data available till then but only those that is a day old, it is timely but not up to date.
- Information should be relevant for taking decisions. In other words, it must be tailored to fulfil the needs of a user. Providing irrelevant information would waste a user’s time.
- It should be concise. In other words, it should be summarized to enable a user to act.
- It should be presented in such a way that its significance is perceived immediately. Bar charts, Pie charts and similar graphical aids are used to highlight the significance of information.
- It should be readily accessible. Accessibility is ensured by appropriate indexing.
- It should be consistent. In other words, if information is recorded in multiple places they must be identical.
- It should be usable for specified purpose.

4. System Integrity

As we pointed out earlier information integrity requires one to ensure the integrity of all steps through which data traverses and is processed before it becomes information used for decision making. In other words, information integrity requires the integrity of the entire information system. Among the concerns of information integrity are also privacy and disaster recovery. Privacy requires the prevention of unauthorized disclosure of information about people such as salary information and bank account numbers. It deals with ethical, moral, and legal aspects of unauthorized disclosure of individual’s information that may even be incorrect.

![Fig. 1A: Simplified diagram of an information system](www.csi-india.org)
Disaster recovery and business process continuity requires the information systems of organizations to return to normalcy after events such as fire, floods, or earthquake with as little disruption as possible.

In Fig. 1 we give a simplified block diagram of an information system. Integrity of the overall system is assured only if the integrity of all the subsystems are assured, namely database integrity, Communication channel integrity, processing integrity, and data disposition integrity [9]. They are summarised in Table 1. Inspecting Table 1 it is clear that it is necessary to guard against accidental or intentional disclosure, alteration, and destruction of data. It has been observed that electronic eaves dropping, accidental disclosure, modification, and destruction of data have occurred in many information systems. To guard against electronic eavesdropping and disclosure encryption of data is essential.

### 5. Information Integrity Policy

Every organization must have an information integrity policy [10]. The policy is primarily intended to identify and manage vulnerabilities in information systems developed by the organization. The main purpose of the policy is to have an audit trail that should include records on data pertaining to:

- Origin of data/information, namely, department where generated and person[s] responsible for generating data. A brief description of data.
- When data was generated, who was responsible for checking/ authentication of data?
- Whether any modification of data/ program done? If so why and when modified and who authorised modification. If modified frequently, version control and trail of versions with authorisation recorded.
- Who checked modification, when was data/program modified, who certified correction of data/ program?
- List of persons having access rights and for what data/program? Who authorised access rights?

<table>
<thead>
<tr>
<th>Step in information Life cycle</th>
<th>Exposure Point</th>
<th>Control methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data gathering</td>
<td>Point of inception</td>
<td>Data preparation controls, sequence numbering, batch control</td>
</tr>
<tr>
<td>Data conversion and organization</td>
<td>Source document conversion to machine readable form. Database design</td>
<td>Data entry and verification. Record and batch totals. Self-checking digits. Error correcting coding. Database integrity checks.</td>
</tr>
<tr>
<td>Data communication and receipt</td>
<td>Electronic or manual movement of data</td>
<td>Define responsibilities. Encryption with confidential key if electronic transmission. Check for data corruption during transmission.</td>
</tr>
<tr>
<td>Information dissemination and Storage</td>
<td>Storage media. Display methods. Archives.</td>
<td>Determining who needs to know what information and dissemination on need to know basis. Data storage media selection. Back up in fireproof vaults. Secure erasure of records stored in computers that are no longer required.</td>
</tr>
</tbody>
</table>
Changes in access rights - why was it changed?

- Is access right password or biometric. Policy on password creation and control. Policy on using biometric access control and password changes.
- Is data communication encrypted. Who is responsible for encryption key maintenance? If key changed when and why and by whom.
- When is data destroyed, by whom, authorization?
- Disaster recovery and business process continuity systems. What back up plan used? How is business continuity ensured after a disaster? Who is responsible?
- Policy on cloud use. Access control and rights. Are there redundant communication channels to the cloud? Who decides what processes to be adhered to when public cloud used? Data corruption control in cloud - procedures used.
- A cardinal principle of the policy is to ensure that data/program creation and checking are done independently and roles and responsibilities of departments/managers are specified in a document.
- How is the system protected from viruses and denial of service attacks? Is virus protection up to date? Person responsible for firewalls and network protection.
- Who checks back doors if any? How is system protected from eavesdroppers?
- Data archiving and destruction policies. What data is archived? Where archived and by whom? Are legal requirements for retention of data fulfilled?
- When a person leaves an organization policies to deal with his/her passwords and access privileges. Contractual obligations of employees and contractors on non-disclosure of information.

6. Conclusions

Computer based information systems are vital for all organization today. Even a small disruption of information systems has serious consequences on functioning of organizations. They are vulnerable from both internal and external threats. Vulnerability has been heightened by networking of computers and the advent of cloud computing. It is thus vital for organizations to protect systems from accidental or malicious modification, disclosure, and destruction of data. System integrity methods should not be incorporated as an afterthought but must be introduced as part of the information system at the design stage. There should be a heightened awareness among all members of the organization about the need for system integrity. It is imperative to have documented policies on information integrity. Introducing information integrity measures increases the cost of designing system and also takes time. However, this expense will be much smaller compared to the losses incurred and damage to the reputation of organizations if the information system is compromised.

Acknowledgment

A different version of this article was presented at a discussion meeting titled “Information Integrity- Issues and Approaches” held in 1995 at the Indian Institute of Science, Bengaluru and appeared in the Proceedings published by the Information Integrity Foundation, New Delhi. I thank Prof.V.V. Mandke, who organized the meeting and edited the proceedings along with me. I thank him for reading an earlier version of this article and for his perceptive comments. I thank Dr. S.Ramani (past President and Fellow CSI) who critically reviewed this revised article and gave me many useful suggestions for improving it. As the topic has gained in importance with the emergence of cloud computing and IoT, I felt a wider audience of young professionals should become aware of integrity issues in designing Information Systems and hence wrote this article for the CSI Communications.

References


About the Author

Prof. V. Rajaraman is a life Fellow of CSI and was awarded the lifetime contributions award by CSI in 2011. For a detailed biodata please see https://en.wikipedia.org/wiki/Vaidyeswaran_Rajaraman
Wow, the activated classroom, with activation of ICT as an expertise, is a fun learning exploration for quality and satisfaction for the kids. How children learn is a concern today for we can not teach the way we were taught. Teaching through technology must be a practice rather than an occasional occurrence, for sure if there has to be a Wow feature within classrooms.

As teachers we must not use technology as a silicon coating, but with harnessing the power of technology to connect with our students. No more it is about copying and pasting which we have had been doing over the years. For power corrupts politicians so as the powerpoint corrupts the teachers, if it has just slides and no explanations. For a matter of thought and intelligence, the platform should be to share for show rather than expecting it to be the only parcel for knowledge delivery. There is a certain need to implement a new way of teaching through technology and hence a digital pedagogy is what is required the most. The teachers need to introspect how children may learn in this networked environment. We can’t simply take a text book and deliver it digitally, rather the need here is to explore the power to harness the best via connectivity and creativity to connect.

We just can’t actually think and re-discover the chalk board and make it a smart board to deliver knowledge. What is required is a novel mindset of love, care and delivery of priorities for our children within classrooms. We ultimately need a different paradigm for teaching, a different pedagogy which talks about creation, control of chaos, connect to correcting and above all consumption to creation. The teachers need to change their thinking of how they are going to use technology in education. From youtube to curating knowledge via Wikipedia, everything explores with pride when there is an experiential learning in progress. The classrooms need to exercise the aroma of ICT as a periodic affair.

For sure, we are living in a world of change, there are ample tweets each minute, ample facebook page views each minute. The academic Donald Norman describes skeuomorphism in terms of cultural constraints: interactions with a system that are learned only through culture. The term which intensifies the tech world with pride. The world has only been used in the tech industry for a few years, where its meaning has changed, says Dan O’Hara, an academic at Birmingham City University. “Skeumorphs are not strictly something that can be designed,” he says. “They occur unintentionally when aesthetic styles are inherited without thinking.” The photo views of flickr which mounts to n’ undefined, explores the universal learning of repute. With each minute of over 47,000 app downloads on the apple store encapsulates a new phase of dimensional learning taking place out of the hunger for knowledge. Of course all these facts did not exist before 2004 by any chance. The availability of data online fascinates the new learner in multiple ways who tend to be a multitasker in pave to grab the unknown. To sound far-fetched but true, the schools over the years have not changed. They have taken the same task to be limited to rows and columns with a teacher at pace. They typically at large have no technology hence there has been no change. There are reports too, “Failed iPad Experiment Shows BYOD Belongs in Schools.”, “LA. Cancels iPads-in-the-schools program: a failure of vision, not technology. In spite of all our heavy investments at schools, it appears there is a failure of our strategy or the vision to implement the best of technology in education. And above all it appears the failure of our pedagogy. One of our mistakes as educators is CTRL + C & CTRL + V. Necessarily as COPY and PASTE for this just can’t solve the concerns but expands the issue in particular. This is one of the mistakes we get to govern while implementing technology in our schools.

Similarly, the conclusion goes by fetching the scenario of obvious reasons, which relate to shifting the teaching into a new realm. The core teaching principles having a shift, need an activated model so as to conclude with the no looking back in perfection. The teachers need to be an advocate for the holistic education. This transforms the learners in a big way to assist learning and make it happen within the classrooms. Teachers need to keep things simple and do what works for them. For we, the teachers cannot teach the way we were taught. Above all the students, at large, would only like the subject if they like the teacher and this is one of the solitaire truth for any holy classroom in particular. Teachers need to have a wellness routine planning sheet, getting the win-win approach of the happiness index of the students, roll number wise. Indeed, the classroom management has been identified as a major concern for teachers and if they don’t get along the learners as bosses or clients with affection, the management of the class appears a slang. The teachers in majority have a wrong notion that classroom management is much to do with discipline only and is limited to the children being quiet in the class,

The IT Oriented Classroom!

Dheeraj Mehrotra
Academic Evangelist, Author & National Awardee, Next Education India Pvt. Ltd. Hyderabad
whereas the goals include identification of misconceptions about managing the teaching, the students and the consequences. The teachers of age need to broaden the very conception of classroom management and ultimately need to provide a framework among the colleagues for developing their own classroom management plan. Engaging the children in instructions often leads to classroom management but is limited to a classic time only. For having an activated classroom, there has to be a thoughtful physical environment supported by establishing caring relationships and implementation of engaging instructions.

About the Author

Dr. Dheeraj Mehrotra is an Academic Evangelist, Author & National Awardee, Next Education India Pvt. Ltd. Hyderabad. He has an expertise in teaching ICT for over a decade and has published over 40 books on ICT for ICSE/ISC/CBSE Students with particular framework on C++, JAVA and Fundamentals. As an academic evangelist he has conducted over 1000 workshops for schools principals and teachers and has an interest in writing books, blogging and developing educational applications for students, teachers and parents. He was figured in the LIMCA book of Records and INDIA BOOK OF RECORDS recently for developing over 150 educational mobile applications for the google play store. He can be reached at: dheerajr@nexteducation.in

Digital India Seminar

February 10th, 2017, ‘Digital India – The technological transformation’ one day seminar. Organized by Department of Computer Science & IT, Amrita School of Arts & Sciences, in association with Computer Society of India-CSI student branch

Speakers:

1. Mr. Santhosh V T, Technical Director, NIC, Govt. of India
2. Mr. Ajithkumar K P, Senior Manager, Federal Bank
3. Mrs. S Sreelatha, Scientist -B, NIC, STDC

Presided by Dr. U Krishnakumar, Director, ASAS Kochi.

Digital India Seminar

CSI Student Branch Social Outreach


Organized by the Computer Science & IT Department of Amrita School of Arts & Sciences in association with the CSI student branch and Samskrithi-Cultural Forum.
Technical Trends

Universal Acceptance: Towards A Local Language-enabled Internet

Don Hollander
Secretary General of the Universal Acceptance Steering Group

Satish Babu
Former President and Fellow of CSI

Introduction

The Internet has emerged as one of the most important communication media in the history of mankind, and most of us use it daily for a variety of purposes that are informational, educational, recreational and transactional.

Despite its deep reach, there are some barriers that the vast majority of Indians face while using the Internet. Apart from issues of technology & access, language is one of the most important barriers that we have to get past in India. The most basic of Internet addresses—email IDs as well as domain names—are largely represented in English (Roman alphabet) and not in any of the 13 scripts of the 22 official languages of India.

There have been several efforts to introduce vernacular-friendly domain names and email addresses on the Internet for several years. The most important outcomes of these efforts are Internationalized Domain Names (IDNs) that have been introduced by the Internet Corporation on Assigned Names and Numbers (ICANN), and the Universal Acceptance Initiative (UAI), a community-driven initiative that works with organizations such as ICANN and the Internet Engineering Task Force (IETF) to promote Universal Acceptance of internationalized Domain names and email IDs.

Background

Since 2006 the Domain Name System (DNS) has expanded dramatically, not only fueling competition, choice and innovation, but truly enabling a multi-lingual Internet. There are now more than a 1,500 top-level domains (TLDs), many of which are longer than the traditional two- and three-character (e.g. .com, .edu, .nz, and .org) or are in non-ASCII based scripts – such as Arabic, Cyrillic and Thai.

The expansion allows people to claim a domain name that best reflects their sense of identity. While this expansion is critical in bringing the next billion people online and growing the global Internet economy, the incorporation of these new domains across the global Internet is not an entirely automatic process. CIOs, web administrators, application developers and others have an important role to play in making sure their applications are compatible with the evolved Internet infrastructure. That’s why we’re reaching out to make sure you know about this change.

The issue at hand

Many organizations and business have not updated their systems to accommodate the new domains or, in other words, become Universal Acceptance (UA)-ready. As a result, many applications and Internet-connected devices and systems are unable to accept, validate, store, process or display all domain names. This causes problems for organizations and headaches for users because if the applications do not recognize or appropriately process the new domain names or email addresses that use these extensions, it will result in lost customers and a poor user experience.

Resources available to assist you

To address these issues and provide support, stakeholders and industry leaders such as Apple, GoDaddy, Google, ICANN, Microsoft and Verisign, created the Universal Acceptance Steering Group (UASG). The UASG exists to help organizations ensure their systems are UA-ready and able to accept all domain names and email addresses in any valid script.

The UASG has developed a number of helpful guides and resources which are available at https://uasg.tech/documents. Of particular note is the Quick Guide to Universal Acceptance (UASG005), which is available in multiple languages, as well as the Introduction to Universal Acceptance (UASG 007), a comprehensive technical document on Universal Acceptance and the key issues that developers and system architects need to know.

We encourage you to visit our website and view these useful materials, and also to get involved with the UASG (you can join the mailing list at https://uasg.tech/subscribe) so we can work together to fully incorporate these new domains for the benefit of the next

About the Author

Don Hollander is the Secretary General of the Universal Acceptance Steering Group (http://uasg.tech/), which is a community-driven initiative that promotes Universal Acceptance. Don is a New Zealand-based former CIO who has worked for very large domestic and international corporations. Email: don.hollander@gmail.com

Satish Babu is a Former President and Fellow of CSI, the Chair of the Asia-Pacific Regional At-Large Organization (APRALO) of ICANN, and the Co-Chair of the Internationalized Domain Names Working Group (IDN-WG) of the At-Large Advisory Committee of ICANN. Email: sbabu@ieee.org
Assessing Efficacy of Question and Answer Services: A Comparative Study

Anudeep Vishwakarma and T. Arunkumar
School of Computer Science and Engineering, VIT University, Vellore – 632014

Advent of the Internet and World Wide Web has opened a multitude of possibilities for enhancing productivity, quality and reach of information services. Now it is customary to search even the most basic information on the Internet. However, the information explosion has made it difficult to access the right information at the right place and at the right time. Several question and answer (Q&A) services have emerged to cater to the above need. These services provide a plethora of features apart from core functionality of posting and browsing questions and answers. Some of these services focus on specific domains. In this paper, we propose a set of parameters to assess the efficacy of Q&A services. We discuss about some of the popular Q&A services such as Quora, Stack Exchange, Answer Garden, Yahoo Answers and Answers.com. Further, we compare these services using the parameters and identify the shortcomings.

Keywords: Q&A service, Information Mining

1. Introduction:

   The Internet and its unprecedented growth have brought along a deluge of services that cater to a variety of its users. Services like World Wide Web, search engines, email and instant messaging has changed the business, intellectual and social landscapes. People are now able to communicate with other people across the globe, without leaving their work places or homes. The Internet has endowed people with information that is close at hand. This allows one to be quickly enlightened with any subject matter at any place and any time. The Internet can be seen as a tool to resolve problems. This idea has been realised with the help of forums and question & answers (Q&A) services. These services allow users to post their questions and problems which will then be answered by the community. The community may comprise of subject matter experts and/or ordinary users who frequent the community. Quora, Stack Exchange and Answers.com are a few popular examples of such services. Q&A services typically involve actors such as Question Originators, Experts and Question Moderators as shown in Table 1.

   Crowdsourcing is becoming essential in a wide range of applications that require human intelligence in addition to computerised systems for problem-solving. However, it faces two big challenges viz., aggregation and quality control of answers provided by humans of varying levels of expertise. Hung, Nguyen Quoc Viet, et al. [1] presents a benchmark for evaluating aggregation techniques in crowdsourcing. They analyse the results obtained and believe that their findings can serve as guidelines for crowdsourcing applications. In another work they [2] discuss a tool that gathers inputs on difficult cases and thus guides an expert to validate crowd answers. Their tool also helps in budget allocation between the expert and crowd.

   Using an empirical study, Yu, Lixiu, Aniket Kittur, and Robert E. Kraut [3] demonstrate an approach that enables crowds to generate domains of expertise and helps them identify more distant domains using abstract representation. They find that crowds become more creative by looking at distant domains. Afuah, Allan, and Christopher L. Tucci [4] argue that crowdsourcing is preferred by firms under certain circumstances for problem solving rather than using an internal or a designated solution provider. The above improves the efficiency and effectiveness depending upon the problem characteristics and the required knowledge to find the solution. It also depends on the crowd and the solutions that are to be evaluated.

   In a detailed analysis of Quora, [5] Wang, Gang, et al. [5] study the factors that impact its growth. They find two significant factors contributing to Quora’s knowledge base. The first one is users’ heterogeneity driving their

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Table 1 : Actors in a Q&A service

<table>
<thead>
<tr>
<th>Actor</th>
<th>Role</th>
</tr>
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<tbody>
<tr>
<td>Question Originator</td>
<td>A person who posts a question on a Q&amp;A service.</td>
</tr>
<tr>
<td>Expert</td>
<td>A person with a high level of knowledge or skill relating to a particular subject or activity.</td>
</tr>
<tr>
<td>Question Moderator</td>
<td>A person who moderates the questions on a Q&amp;A service.</td>
</tr>
</tbody>
</table>
attention and activity. The second factor pertains to graphs connecting related questions that direct them to interesting questions.

In a comparison of answer quality on four Q&A services – Yahoo Answers, WikiAnswers, Wikipedia Reference Desk and Askville, Phina Fichman found that the quality of answers found on the above Q&A services have no direct association with the service’s popularity [6]. It was also found that multiple answers for a question do not indicate better solution to the question.

Remainder of the paper is organised as follows:

Section 2 discusses the criteria for assessing efficacy of Q&A services. It identifies seventeen features that will be required for comparing and analysing these services in the later sections.

Section 3 provides a summary of five Q&A services that are considered for comparison.

Section 4 tabulates the comparison and analyses the tabulation to reveal the limitations in current approaches.

1. Criteria for assessing efficacy of Q&A Services

Users face challenge in choosing an appropriate Q&A service from the numerous services available online. Though there have been attempts at gauging performance of Q&A services, there has been no comprehensive study in this direction. We reviewed more than ten Q&A services and arrived at several parameters that can be used to assess the efficacy of such services. The following paragraphs describe these parameters.

   Feature: Identification of Experts
   Rationale: Q&A services can identify users who possess knowledge and experience in a certain subject matter as experts. The answers given by these experts can be highlighted among other answers.

   Feature: Search and browse questions
   Rationale: Users must be able to easily search and browse all the previously posted questions and also view their answers if they are solved.

   Feature: Support for open ended questions
   Rationale: Open ended questions have wider scope and help get more details on the solution. On the other hand, close ended questions help maintain the integrity of Q&A services. Such questions are more common in Q&A services tied to technical communities.

   Feature: Timestamp of questions posted
   Rationale: Higher priority questions are placed towards the beginning of the queue of questions to be solved. However, it must be taken care of that this feature is not misused.

   Feature: Priority of questions
   Rationale: The level of urgency required to answer a question.

   Feature: Rating of questions and answers
   Rationale: Setting an expiry is helpful in maintaining the relevancy of questions on a Q&A service.

   Feature: Setting an expiry
   Rationale: Setting an expiry is helpful in maintaining the relevancy and its answers’ credibility. The ratings should not be used to rank the question against other questions.

   Feature: Prevention of duplicate questions
   Rationale: Questions and their answers can be rated if they are relevant and/or helpful. The ratings must be used only to gauge the question’s relevancy and its answers’ credibility. The ratings should not be used to rank the question against other questions.

   Feature: Prevention of spam questions
   Rationale: Spam questions bring down the credibility of a Q&A service. Policies and rules need to be in place in order to avoid such questions. Few services penalise the users who post spam questions by prohibiting them from posting further questions.

   Feature: Prevention of questions asking beyond information
   Rationale: Q&A services should...
have certain policies and rules in effect that prohibits users from making other users do their work in the name of asking questions.

**Feature:** Handling Unanswered questions

**Description:** Questions that have been left unanswered for a considerable amount of time.

**Rationale:** Unanswered questions can be deleted if they have become irrelevant. Their irrelevancy can be asserted with the help of experts and users. These questions can also be merged with other similar questions, if possible.

**Feature:** Linking questions

**Description:** Questions that are contributing towards the same end goal can be linked together.

**Rationale:** Linking questions will help users get a more thorough understanding of the issue and also educate them of possible future problems that lie ahead.

**Feature:** Background processing of questions and answers

**Description:** A Q&A service can process the amount, type and time of posting questions and answers among other things to generate trends.

**Rationale:** The trends generated from this background processing can be used by concerned stakeholders like government agencies, non-governmental organisations, etc. to better serve their communities. It can be used by businesses to come out with products that can solve problems being posted. It can also be used for market analysis.

**Feature:** Public/private questions:

**Description:** Setting a visibility scope while posting a question limits the number of people that are allowed to view the question and its answers, if any

**Rationale:** Making questions public/private is helpful when taking a survey within a confined group of people. This is also useful when asking questions that have a degree of confidentiality.

3. **Q&A Services selected for comparison**

**Quora:**

Created in 2009, Quora is one of the most popular Q&A service online. It has been available for public consumption since 2010. Unlike other prevailing Q&A websites, Quora was one the first to embrace social networking as one of its core functionality. This can be attributed as a cause for the explosion in its popularity and user base. The questions posted on Quora are not tied to any specific domain. It has since been used by various celebrities, entrepreneurs, army officials and intellectuals among other people to answer people’s queries. Quora employs the use of graphs as its structure. The first graph maintains list of domains a user follows. The second graph gives Quora its social structure, maintaining a list of people the user follows and a list of people who follow the user. The third graph links related questions [5].

**Stack Exchange:**

Stack Exchange came onto scene in 2009 being shaped from Stack Overflow. Stack Overflow itself was launched in 2008 and has gained a reputable position among the ranks of reference sites. It is ranked first among reference sites on Alexa [7]. Stack Overflow and its parent site, Stack Exchange primarily deal with technical domains. The top 5 communities on Stack Exchange, based on number of questions, are programming (Stack Overflow), mathematics (Mathematics), power computing (Super User), Ubuntu [Ask Ubuntu], server computing [Server Fault] [8]. One of the reasons that can be credited to Stack Exchange’s popularity is the average time between posting a problem and obtaining its solution, viz. 11 minutes on Stack Overflow [9]. Stack Exchange employs strong moderators that control spam and duplicate questions to maintain the integrity of the Q&A service.

**Answer Garden:**

Answer Garden is collaborative brainstorming and feedback tool. Questions are usually open ended that have many answers. These answers are limited to twenty or forty characters. Questions posted can be bounded to a specific group of people or can be posted on the public domain. The questions on remain for a certain period of time, after which service no longer accepts answers for the questions. The answers are presented in the form of a word cloud. Answer Garden is one of the few Q&A services that do not require the question originator to have the site’s membership [10].

**Yahoo Answers:**

Yahoo Answers was created in 2005 and was available for public use in 2006. It replaced Ask Yahoo, Yahoo’s previous Q&A platform. It is one of the first Q&A service to gain traction. Yahoo Answers is ranked second among reference websites on Alexa [7]. The community guidelines in place promote helpful users by featuring them in their blogs and rewarding them with points. This helped foster a valuable Q&A community. Yahoo Answers has been used in various academic research works such as the one carried out by Chirag Shah [11]. Chirag Shah’s paper tries to quantify the effectiveness of Yahoo Answers. He concluded that though Yahoo Answers is effective as a Q&A service, it takes considerable amount of time to get an acceptable answer after posting a question. The success of Yahoo Answers resulted in the launch of newer Q&A services. The success of these new services has stalled the growth of Yahoo Answers and the service has now been overshadowed by Stack Overflow. Yahoo Answers allow questions to be posted in various categories.

**Answers.com**

Formerly known as GuruNet, Answers.com was founded in 2000. It comprises of two websites, the commercial arm – Answers and the wiki based website WikiAnswers. The commercial arm switched to an ad-supported business model in 2005. Answers.com is one of the Q&A services that embrace the concept of answering questions by experts. Users can register themselves as expert and can also maintain a domain/category. The service is complemented with detailed guidelines that cover vast number of points of discussion such as cyber bullying, religions, online etiquette, plagiarism spamming and resolving disputes among other things [12].
### 4. Comparative Study and Results

#### Table 2 Comparison of Q&A Services

<table>
<thead>
<tr>
<th>Features</th>
<th>Quora</th>
<th>Stack Exchange</th>
<th>Answer Garden</th>
<th>Yahoo Answers</th>
<th>Answers.com</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration of Question Originator</td>
<td>Registered user</td>
<td>Registered user</td>
<td>Anyone</td>
<td>Registered user</td>
<td>Registered user</td>
</tr>
<tr>
<td>Identification of Experts</td>
<td>Assumes one to be an expert in a domain if the user follows the domain.</td>
<td>Identifies user as expert if the answers posted are well received by the community.</td>
<td>No</td>
<td>Identifies user as expert if the answers posted are well received by the community.</td>
<td>Distinctly identifies experts</td>
</tr>
<tr>
<td>Search and browse questions</td>
<td>Yes</td>
<td>Yes</td>
<td>Questions have limited visibility. Questions can only be shared.</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Support for open ended questions</td>
<td>Both</td>
<td>Close ended</td>
<td>Open ended</td>
<td>Both</td>
<td>Both</td>
</tr>
<tr>
<td>Timestamp of question posted</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Priority of questions</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Categorising questions</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Set question expiry</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Rating of questions and answers</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Moderation of questions</td>
<td>No</td>
<td>Yes</td>
<td>Optional</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Prevention of duplicate questions</td>
<td>Allows duplicate questions</td>
<td>Robust against duplicate questions</td>
<td>Allows duplicate questions</td>
<td>Robust against duplicate questions</td>
<td>Robust against duplicate questions</td>
</tr>
<tr>
<td>Prevention of spam questions</td>
<td>Mildly robust against spam questions and answers</td>
<td>Robust against spam questions and answers</td>
<td>Optional spam filter</td>
<td>Robust against spam questions and answers</td>
<td>Moderately against spamming</td>
</tr>
<tr>
<td>Prevention of questions asking beyond information</td>
<td>Not explicitly restricted</td>
<td>Robust against questions that inadvertently ask people to work</td>
<td>Only accepts ideas and feedbacks as answers</td>
<td>Moderates questions that asks for more than advice or help</td>
<td>Allows questions that ask for more than advice</td>
</tr>
<tr>
<td>Handling unanswered questions</td>
<td>Unanswered question can either be deleted by its originator or be merged with a solved question having high similarity</td>
<td>A user agent is deployed to find unanswered questions and remove them if they fall under certain circumstances</td>
<td>No provision to mitigate unanswered questions</td>
<td>Unanswered questions are removed after a week of being posted</td>
<td>No provision to mitigate unanswered questions</td>
</tr>
<tr>
<td>Linking questions</td>
<td>Explicitly allowed by pasting a link within the question or answer</td>
<td>Explicitly allowed by pasting a link within the question or answer</td>
<td>No provision</td>
<td>Explicitly allowed by pasting a link within the question or answer</td>
<td>Explicitly allowed by pasting a link within the question or answer</td>
</tr>
</tbody>
</table>
### Features

<table>
<thead>
<tr>
<th>Features</th>
<th>Quora</th>
<th>Stack Exchange</th>
<th>Answer Garden</th>
<th>Yahoo Answers</th>
<th>Answers.com</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background processing of questions and answers</td>
<td>Uses a PageRank-like algorithm to rank the answers</td>
<td>Aggregates questions and answers into statistical data for public viewing</td>
<td>None</td>
<td>None</td>
<td>Aggregates questions and answers into statistical data for public viewing</td>
</tr>
<tr>
<td>Private/public questions</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

In an nutshell, we find that most of the current approaches described in the literature have serious limitations like:

- Answers to questions are merely based on online sources of information or crowd-sourced information.
- Answers are not evaluated but are simply presented to the help seekers.
- Typically huge volume of information.
- Inability of addressing problems that require right information, right resources and expert guidance.
- Inability to tackle the low value questions posted.
- Lack of mechanism to identify and validate experts.

### 5. Conclusion

We identified a set of seventeen parameters to assess the efficacy of a Q&A service. Each of these parameters were described and rationalised. We surveyed more than ten popular Q&A services currently online. A few of these Q&A services, namely – Quora, Stack Exchange, Answer Garden, Yahoo Answers and Answers.com, were selected and discussed. These services were compared and tabulated against the set of parameters identified earlier. This table was analysed to expose the shortcomings present in the current approaches towards Q&A services. It was found that answers to questions are based on online documents of information. These answers are not evaluated by experts and are presented to help seekers without the authenticity. Searching for questions and its answers become difficult as their volumes are huge. It is also evident that the number of low value questions posted is increasing.

### 6. References:


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**About the Authors**

Mr. Anudeep Vishwakarma [Memb. No. S1260949] is a final year student of B.Tech – CSE at VIT University Vellore. He has been a student member of CSI and ACM since Class 11. He has worked on several projects and participated in several workshops.

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Evaluating Paragraph - Type Answers Online, using Text Analytics

M V S Peri Sastry
B.E, Ph.D [BITS-Pilani], Professor, Xavier Institute of Management and Entrepreneurship (XIME), Bangalore

1. Introduction:
The evaluation of paragraph type of answer scripts online, by computer programs is a tough proposition. The Text Analytics based approach discussed here, discusses a step by step dynamic approach to evaluate the paragraph type of answer scripts online. This method uses my own algorithms developed over time, and tested with live online tests for recruitment.

2. Usage:
In addition to evaluating students' answer scripts, other applications can be, preliminary medical diagnosis based on symptoms, predictive marketing and many other text processing applications.

3. The Algorithmic System:
Pictorially the Algorithmic system can be represented as follows for easier comprehension:

Start

Read script to be evaluated and tokenize using algorithm and Create Linked List L2 using algorithm

Read Master and tokenize using algorithm and Create Linked List L using algorithm

Calculate Thought Mediation Factor (TMfac) using PeriSastry's Algorithm System

Calculate TMFac for all questions in an answer script of one student by this system. Calculate Evf

Repeat the process for all answer scripts

End

Actual algorithms are not presented as they are proprietary in nature and also to make the paper less technical and easy to read and understand. The Algorithmic System proposed here has three distinct parts. This is an effort to incorporate mathematical foundations as invented by me, in evaluation of text based answer scripts by many teachers including me.

3.1 Multi Pattern Search and Evaluation Algorithmic System
3.2 Thought Mediation Factor (TMfac) calculation and
3.3 Calibration
These are discussed below.

3.1.0 Multi Pattern Search and Evaluation Algorithmic System:
3.1.1 Parse the Master script and break it into string tokens. The token end-markers can be a blank space or a comma or a full stop or new-line /line-feed.
3.1.2 Organise these Master script tokens named k3 into the linked list data structure. Let this be L.
3.1.3 Parse the student’s answer script to be evaluated and tokenise the same.
3.1.4 Organise these tokens into the linked list data structure. Let this be named L2.

This has multiple patterns to match with patterns in the master answer.

3.1.5 Sort L in ascending order.
3.1.6 Initialise key-word-count to zero. Initialise Thought Mediation Factor (TM-factor) to zero.
3.1.7 Sort L2 in ascending order.
3.1.8 Multi Pattern Binary Search and Evaluation Process Algorithm: This produces key-word matches (kwct), and relative distance factors between Students' answer-tokens and Master answer-tokens.

3.1.9 kwct is the first parameter of evaluation of Student’s script.
3.2.0 Calculation of Thought Mediation Factor (TMfac): Thought Mediation factor (TMfac) can be defined as quantification of correspondence between thought represented by Master answer script and student’s answer.

3.2.1 Take natural order index of student script token (nOrdSTkn ). Take natural order index of Master key script token (nOrdMTkn ).

tmfac1=0.0;

Calculate Thought Mediation factor (TMfac) using proprietary algorithm developed by me.

3.2.2 TMfactor1 varies from 0.0 to 1.0 only
3.2.3 Similarly TMfactor2 and TMfactor3 are calculated for index of matched tokens and total tokens. The average of these three factors which is called TMfactor and forms the second parameter of evaluation of Student’s script.

3.2.4 A function involving kwct and TMfactor provides a compound evaluation factor of Student’s script.

EvalFunction Evf={((kwct / k3) + Tmfactor) / 2.0 }

Evf can lie between 0.000 and 1.000. Evf 1.0 is equivalent to 100% marks for the particular answer of the question.

3.3 Calibration:
3.3.1 Evf gives the relative merit order of the Answer scripts. If there are say 5 questions, each student will be awarded 5 Evf by the system.
3.3.2 The marks awarded by the algorithmic system will be between 0.000 and 1.000 for each question. In Calibration phase, a moderation / Alphabet mf will be applied to the Evf.

Moderation factor (mf) can be assigned manually or can automatically be assigned depending on a learning phase, where the system tries to take maximum occurrences of Evf range, for each question and reworks the final Evf for all the questions of all the scripts / records of students giving CCM (Calibrated Moderation By Thought).

4. Sample Evaluation and Summary:

First an online test was administered to assess technical knowledge in C, C++ /Java / DotNet at different centres. Then shortlisted candidates were given paragraph-type test to evaluate technical leadership thinking. Mainly the questions were based on Algorithmic Thinking. The summary of system generated Evfs are tabulated as follow.

In the table above, summarised results are categorised as A=EVf high, B= EVf medium, C=EVf low.

One interesting observation is, that after about two years of the evaluation as above, informal feed-back from the recruiter was, that the system helped them identify ‘Technical Leadership Material’ quite early at recruitment stage itself, because of this evaluation of paragraph-type answers and subsequent EVf evaluation.

5. Conclusion:

In this Algorithmic System, I have attempted to define an Algorithmic System for automatic online evaluation of paragraph type of answer scripts. This reduces considerable load on teachers, recruiters and others in evaluation and marking. At the same time, it incorporates computer assisted calibration.

This approach is based on analysis of underlying mathematical approach as invented by me. It does not take the path of natural language processing (NLP) methodology.

I feel that it will be useful. Software Tool using Java, based on this Algorithmic System is also developed by me.

Evf takes into account, the thought, its expression and presentation.

Also, no references are given, as this is original research in the area of Artificial Intelligence (AI) done over the years by the author. That the domain knowledge in a narrow area gets represented in examination answer scripts by sentence constructs, token ordering and technical terms and is quantifiable, is the basis of this research work.

### Table of summarised Results of Algorithmic System’s Evaluation

<table>
<thead>
<tr>
<th>Centre</th>
<th>Number of Candidates</th>
<th>Paragraph Test Evaluation</th>
<th>Date of Algorithmic Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>11</td>
<td>B=2; C=9</td>
<td>Thu 6 Aug, 2015</td>
</tr>
<tr>
<td>B</td>
<td>16</td>
<td>A=4; B=1; C=11</td>
<td>Sun 9 Aug, 2015</td>
</tr>
<tr>
<td>C</td>
<td>10</td>
<td>B=2; C=8</td>
<td>14th Oct 2015</td>
</tr>
<tr>
<td>D</td>
<td>11</td>
<td>A=6; B=4; C=1</td>
<td>Tue 27 Oct, 2015</td>
</tr>
<tr>
<td>E</td>
<td>8</td>
<td>B=2; C=6</td>
<td>6 Aug, 2015</td>
</tr>
<tr>
<td>F</td>
<td>66</td>
<td>A=11; B=36; C=19</td>
<td>Sun 9 Aug, 2015</td>
</tr>
<tr>
<td>G</td>
<td>12</td>
<td>B=1; C=11</td>
<td>14th Oct 2015</td>
</tr>
</tbody>
</table>

---

**About the Author**

**Dr. M V S Peri Sastry** [Membership No. 00007504] is currently Professor, at Xavier Institute of Management and Entrepreneurship (XIME), Bangalore. He has over 30 years of Experience in Software Industry and in Teaching. Among many positions he occupied were, Regional Manager of CMC Limited, Chief-Operating-Officer of ASM Technologies Ltd, Bangalore, Professor and Head of CSE at NIT Trichy, and Professor at University of Trinidad and Tobago. His research interests are Online-Tests, ERP, AI, and Text Analytics.

He holds a B.E degree from Andhra University and Ph.D. degree from BITS-Pilani.
ICT in Education
Semantic enhancement on E-learning: The Research Front

1. Introduction:
E-learning or digitized learning application comprises all learning activities, that are carried out through online or even through offline via networked or standalone computers. Due to e-learning, mostly organizations provide distance courses to students. Also corporate sectors offer e-learning as a method of rationalizing for the costs of their in-house staff training activities. Digitized learning apps are helpful for educational campus where learners can learn their courses online and find relevant information. The advancement of e-learning app is directly linked to the growing access in information and communication technology.

A learning activity represents the means by which the practitioner brings about learning and searches to influence the development of learners. The fig-1 (Knight, 2004), illustrates fully the art of the practitioner at work in creating and sequencing learning activities, by showing the importance of aligning three essential elements at the heart of learning activity design with the overall pedagogical approach and practice. Each of the three elements brings with it factors which will have some influence on the designing process.

1. Learner: It can be defined as an object with their needs motives for learning, prior experience of learning, social and interpersonal skills, preferred learning styles and expectations of the course and of the practitioner.
2. Learning environment: It represents available resources, tools, facilities and services and their match with the learners’ needs.
3. Intended learning outcomes: It represents the purpose behind the learning activity, internal or external goals and targets.

Within the context of any activity, the interaction between these three factors will be dynamic and may influence decisions in an unequal way. The decisions that underpin designing for learning in any particular context, and in any given pedagogical approach, will increasingly involve a selection from both new and established practices, based on perceptions of the learners’ needs, the nature of the learning environment and the intended outcomes, as practitioners seek to orchestrate effective learning by seeking out the most appropriate tools.

The web based learning systems deal with huge amount of data but they don’t maintain consistency and semantics in data.

2. Ontology and web ontology language
The term “ontology” comes from the field of philosophy that is concerned with the study of being or existence. In philosophy, one can talk about ontology as a theory of the nature of existence. In the context of computer and information science, ontology is the formal naming and definition of the entities, properties, and interrelationships among the entities that really or fundamentally exist for a particular domain. In computer science engineering, ontology is a technical term denoting a thing or entity or artifact that is designed to model knowledge about any domain. To represent and model the ontology, RDF, RDFS and web ontology language (OWL) are used. These are the semantic web languages, used for rich and complex knowledge representation about an entity or groups of entities for a particular domain. These semantic web languages are used for modeling the ontology where entities, properties and interrelationships among the properties are represented.

3. Using OWL in a digitized app as e-learning
Although from digitized application such as e-learning app, users find information about any domain area such as agriculture and healthcare application but they can’t find the accurate and meaningful information. The e-learning app plays a vital role for providing information to users and hence it is necessary to identify and design the e-learning or m-learning system semantically over semantic web.
keyboard, mouse, screen size, etc. The subcomponents of learner include learner’s profile, cognitive, physiological, and preferences. The learner profile includes learner’s personal information such as name, age, address, goal, and profession. The preferences contain information about the learner’s preferences including learning style. The physiological and cognitive states are related to the learner’s physical and cognitive characteristics or abilities.

The learning content is another learning object which is the central element in the success of an e-learning application because it determines whether the learner can learn the content without any problem and fully engage in the learning experience. The e-learning application must be able to provide support to the learner in any format type and content type so that user could access all required content or document effectively. The learning content delivered to the learner is of any format that includes text, audio, video, animation, or slide show. The learning objects are shown in Table-1 below.

**Table-1: Determination of Learning Objects and Their Attributes**

<table>
<thead>
<tr>
<th>Learning Objects</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device</td>
<td>1. Keyboard</td>
</tr>
<tr>
<td></td>
<td>2. Type of device</td>
</tr>
<tr>
<td></td>
<td>3. Screen size</td>
</tr>
<tr>
<td></td>
<td>4. Screen resolution</td>
</tr>
<tr>
<td></td>
<td>5. Mouse</td>
</tr>
<tr>
<td></td>
<td>6. Monitor</td>
</tr>
<tr>
<td></td>
<td>7. Speed of Processor</td>
</tr>
<tr>
<td></td>
<td>8. MemorySize</td>
</tr>
<tr>
<td>Learner</td>
<td>1. Learner profile</td>
</tr>
<tr>
<td></td>
<td>2. Learner’s preference</td>
</tr>
<tr>
<td></td>
<td>3. Learner’s cognitive states</td>
</tr>
<tr>
<td></td>
<td>4. Learning style</td>
</tr>
<tr>
<td>Learning Content</td>
<td>1. Text file</td>
</tr>
<tr>
<td></td>
<td>2. PDF file</td>
</tr>
<tr>
<td></td>
<td>3. Audio File</td>
</tr>
<tr>
<td></td>
<td>4. Video File</td>
</tr>
<tr>
<td></td>
<td>5. Slide show</td>
</tr>
</tbody>
</table>

In this learning ontology, we have taken the classes such as Device and the attributes are taken as subclasses such as device type, screen size, keyboard, and monitor which are shown in the code below. Similarly, the learning object LearningContent can be considered as class and its attributes text file, audio, video file can be treated as sub classes which form the learning ontology.

**OWL description logic in Protégé 5.0:**

```xml
<rdf:Description rdf:about="http://www.semanticweb.org/ontologies/2017/7/2/untitled-ontology-98#DeviceType/
<rdf:Description rdf:about="http://www.semanticweb.org/ontologies/2017/7/2/untitled-ontology-98#Monitor"
<rdf:Description rdf:about="http://www.semanticweb.org/ontologies/2017/7/2/untitled-ontology-98#Keyboard"
<rdf:Description rdf:about="http://www.semanticweb.org/ontologies/2017/7/2/untitled-ontology-98#ScreenSize"
<rdf:Description rdf:about="http://www.semanticweb.org/ontologies/2017/7/2/untitled-ontology-98#ProcessorSpeed"
<rdf:Description rdf:about="http://www.semanticweb.org/ontologies/2017/7/2/untitled-ontology-98#MemorySize"/>
```

Here we have built ontology under learning domain using semantic languages for achieving semantics in data. Hence, the ontology under any domain can be built accordingly so that user from any domain can find and retrieve information from the web.

4. Conclusion

Although there exists e-learning information systems, but they are not designed in a meaningful manner. Also, these learning information systems don’t identify learning objects. Here in this way information systems can be designed for e-learning apps where we have identified learning objects and their attributes. Further, these learning objects are modelled and built semantically using semantic languages such as OWL DL to form learning ontology. In this learning ontology, learning objects are modeled as classes and their attributes are taken as sub classes. The classes and the subclasses are designed semantically to avoid data redundancy. To achieve semantics in a digitized app, the classes and their sub classes are modeled through property axioms and class axioms using OWL DL in protégé framework.

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**About the Authors**

**Jibitesh Mishra** has more than 20 years of teaching and research experience. Currently, he is Associate Professor in the Department of Computer Science and Application, College of Engineering and Technology, Bhubaneswar, a constituent college of Biju Patnaik University of Technology, Odisha. He has authored many books of repute. He has written many papers and organized conferences in the area of web engineering and application. He is a CSI member having ID 915528 and his research interests are fractal graphics, pattern recognition, quality web engineering and cloud computing.

**Sasmita Pani**, is doing Ph.D. under Prof. Jibitesh Mishra and her research area includes mobile native app development, web engineering and semantic web. She was working as ASST. Prof in CSE Dept. in INDUS groups of institutions, Bhubaneswar, India.
Cloud Based Online Higher Education: for Digital India Learners

Md. Shams Raza
Coordinator of Xavier Centre for Computer Studies, Patna

Introduction:
Higher education of India is one the largest education system in the world. There are a number of governing bodies for the control and support of Indian higher education system out which UGC is the main.

According to lastly conducted 2011 Census, about 8.15% (68 millions) of Indians are graduates. Though the growth of Indian higher education system is significant during 2000 to 2011 which includes nearly 20,000 colleges and more than 8 million students. Presently as per MHRD record in 2016, in India there are 44 central universities, 540 state universities, 122 deemed universities, 90 private universities, 5 institutions established and functioning under the State Act, and 75 Institutes of National Importance which include AIIMS, IIT’s and NIT’s among others.

In spite of all above facts Indian higher education is in need of radical reforms to fulfill the target set by MHRD to enhance Gross Enrollment Ration (GER) from 12% to 15% in XI Five Year Plan and up to 30% by the year 2020.

Cloud based Online Higher Education will be a very successful alternative for boosting the GER in Higher Education and this will be highly supportive system for Digital India mission. Being an online educational service it eliminate various constraints of higher education faced by the learners time schedule, distance, seat limitations, age limits, availability, economic limitations. This alternative educational system will facilitate prospective learners with flexible time and pace, on demand choice based learning and assessment. This will also eliminate geographical boundaries, travel efforts, additional cost. This system will fulfill dual requirements of the learners by providing them higher education into their respective streams and at the same time making them digitally literate, as they will be using ICT tools in their day to day learning process.

System Components and System Architecture:
Cloud based Online Higher Education System will be a collaborative system having multiple components consisting different educational systems, different educational resources and cloud based ICT tools. All the resources will be digitize and mounted on cloud storage and service delivery/Accessibility will be provided by cloud based ICT tools & channels. All such components will be integrated under specific system structure which will formulate System Architecture for the proposed Cloud based Online Higher Education System which is presented in this paper.

Components of Cloud based Higher Educational System:
This system will have following components:
- Centralized Online Enrollment and Certification system on specific Govt. Cloud having all cloud components which include IaaS,PaaS & SaaS
- Coordinating Educational institutions equipped with ICT infrastructure
- Digital educational contents on cloud storage
- Virtual Classrooms on cloud infrastructure
- ICT enable online examination/evaluation systems on cloud IaaS,PaaS
- Cloud as backbone system

Centralized Online Enrollment and Certification System:
This will be the main coordinating system under central educational agency may be UGC or MHRD which will enrolled and facilitate learners through its collaborative sub-systems. This component is basically represent Cloud based Online Higher Education System fully deployed on a Govt. Cloud.

Fig. 1: System Architecture for Cloud Based Online Education System
having all the cloud components IaaS, PaaS, SaaS with a system architecture as below;

Coordinating Educational institutions equipped with ICT infrastructure
All such higher educational institutions having sufficient ICT infrastructure for appropriate interfacing with Central Cloud Based Online Education System will be integrated under this components as resource coordinators. They will offer their courses with specified intake capacity through the central system and continue their educational services to the learners allotted to them by the central system. All the processes will be carried out using online channels provided by the central system.

Digital educational contents on cloud storage
All the coordinating educational institutions will provide digital contents [course materials, assignments, project design, guidelines] to the central system which made available all such digital contents to the learners through content repository on cloud storage by easy download facilities on PCs, Tablets and Smart phones. The availability should be ensured for 24 x 7.

Virtual Classrooms on cloud infrastructure
Under this component online live classes may be organized at central system which will be made accessible to the learners through cloud network services and applications services. Also recorded lectures will be made available through web videos and mobile apps to facilitate the learners to complete their study with flexible time and pace. The availability should be ensured for 24 x 7.

ICT enable online examination/ evaluation systems on cloud IaaS,PaaS.
The central system will provide online examination system using cloud services. This examination system will be made available to the learners as per their convenient i.e. on demand examination. Under this system learners have to registered themselves at least 24 hrs before they want to appear. After receiving the request of learners the system will prepare online exam schedule for the learners and send them along with their login details which include biometric. Learners will be advised to appear in the online exam in the nearest centre allotted by the central system which will be part of cloud IaaS services. After exam evaluation will be done by software automatically and grade will be generated with remarks.

Cloud as backbone system
This is the vital component of Online Higher Education System which make this educational system cost effective both for Govt. and Learners for Quality Education services. Cloud Computing is a general term used to describe a new class of network based computing that takes place over the Internet,

- basically a step ahead from Utility Computing
- a collection/group of integrated and networked hardware, software and Internet infrastructure (called a platform).
- Using the Internet for communication and transport, provides hardware, software and networking services to clients

These platforms hide the complexity and details of the underlying infrastructure from users and applications by providing very simple graphical interface or API [Applications Programming Interface].

- In addition, the platform provides on demand services, that are always on, anywhere, anytime and any place.
- Pay for use and as needed, elastic scale up and down in capacity and functionalities
- The hardware and software services are available to general public, enterprises, corporations and businesses markets

Cloud computing is an umbrella term used to refer to Internet based development and services. A number of characteristics define cloud data, applications services and infrastructure:

- Software as a Service [SaaS]
- Platform as a Service [PaaS]
- Infrastructure as a Service [IaaS]

Software as a Service [SaaS]
SaaS is a model of software deployment where an application is hosted as a service provided to customers across the Internet.

SaaS alleviates the burden of software maintenance/support but users relinquish control over software versions and requirements.

Platform as a Service [PaaS]
PaaS is a model of System deployment Environment where client
created application is deployed as a service provided to customers across the Internet. In general, they are built on clusters of PC servers and off-the-shelf components plus Open Source software combined with in-house applications and/or system software.

**Infrastructure as a Service (IaaS)**
IaaS is a model of system availability where processing services, network channels, storage & computing resources is provided to customers across the Internet.

The “no-need-to-know” in terms of the underlying details of infrastructure, applications interface with the infrastructure via the APIs.

The “flexibility and elasticity” allows these systems to scale up and down at will utilising the resources of all kinds, CPU, storage, server capacity, load balancing, and databases.

**Conclusion:**
After going through the facts related to higher education it is almost visual that Cloud Based Online Education System is the best alternative for enhancement the Gross Enrollment Ratio by 2020. Other factors for selecting this model of education are;

- **Eliminator of Obstacles**: People can face several obstacles in obtaining a higher education. Nearly 200 survey respondents cited high level of capitation, rural and urban divide, non availability of institutions in near by locations.

- **Eliminator of social and gender barriers**: One striking benefit of Cloud Based Online Education System is the idea that eLearning programs can sidestep many social barriers. Women are not faced with the issues of gender segregation that occur in many colleges and universities of the world. At times, there may be various courses that are not available on nearby female campuses and therefore women would not have access to the classes they needed to pursue their chosen educational route. With Cloud Based Online Education System, many women are finding that male only classes may be simultaneously available online to female students.

- **Supports in balancing between social responsibilities & educational needs fulfillment**: Another social barrier that eLearning mitigates is the clash between Office and family responsibilities and class attendance. In fact, this convenience and flexibility with coursework and assignment completion is a benefit to just about everyone who chooses Cloud Based Online Education System.

- **Cost effectiveness**: Cost can play a big factor in anyone’s decisions for obtaining a higher education. Cloud Based Online Education System does have the ability to alleviate some of the cost barriers. For people that live in geographically remote areas, traveling to a college or university on a regular basis can be logistically difficult as well as cost prohibitive. Cloud Based Online Education System resolves this issue because students have access to courses anywhere they have an Internet connection and personal computer, tablet, or other mobile learning device.

- **Support for Work and Study simultaneously**: Furthermore, people that have a source of income do not need to disrupt their work in order to work around a class schedule. Again, the convenience and flexibility with the timing of Cloud Based Online Education System coursework resolves this issue by allowing people to obtain an education without disruption to their work schedule.

With all of these benefits in mind, we are optimistic that Cloud Based Online Education System will move educational systems forward, especially in the most influential aspects that touch the people lives, and especially for disadvantaged or marginalized persons who are otherwise denied formal education and developmental opportunities.

**References**:

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**About the Authors**

**Md. Shams Raza**, CSI Senior life member CSI No. 100092133
- Coordinator of Xavier Centre for Computer Studies, Patna
- Programme Incharge, IGNOU Computer Programme, St.Xavier’s, Patna
- Former Chapter Chairman of Patna ,Computer Society of India
- Former State Student Coordinator (Bihar), Computer Society of India
- Senior Life member Indian Science Congress Association
- Life Member of ACM, Professional member of IEEE

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Digitalization – The need of the hour in Current Education

S. Durga Bhavani
Asst. Professor in Aditya Global Business School

K Pavan Kumar
Asst. Professor in Aditya Global Business School

Digitalization has played an inevitable role in every realm of Indian economy. In the current scenario digitalization has edging its way into the educational institutions. The traditional methods of teaching and learning became obsolete where the revolutionary fluid illustrative modules embraced with smart classroom and “e” concepts like e-library, e-learning, e-monitoring and mentoring concepts dominating the proceedings in educational institutions. Digitalization has made the education as a stress free and more lucrative domain for both teachers and students.

Education before two decades perceived as stressful phase of an individual where the students are taught with preconceived notions cited in the textbooks. But post digitalization, education facilitated the student with a practical exposure using audio visual aids where by enhancing an individual’s intuition and reasoning abilities. Finally digitalization has erased the border between class room and outdoor environment. The traditional method of “Chalk & Talk” replaced by “Youtube”, “Google” “Facebook” etc.

The Impact of Digitalization on Education:

Digitalization assist the students in accessing digital information efficiently and effectively. The advancements in digital education supports student-centred and self-directed learning. It also provides a creative learning environment and improves critical thinking skills to the students. Digitalization also increases the teaching & learning quality.

Advancements that enhances the student learning process

Virtual learning where technology is used as a support of classroom activities

Virtual Manipulatives are Web-based, visual representation of a dynamic object that provides opportunities for constructing mathematical knowledge.

E-books and E-Magazines, an electronic version of a printed book/ magazine which can be read on a computer or a specifically designed handheld device.

Better Simulations and Models, a software program that allows the student to observe the operations without performing them

Digital Circulars, a circular which can be sent through online as feeds.

Enabling the students with internet and continuously monitoring them using proxy settings and Lisp servers
Taking the advantage of Google:
Improved Interaction between teacher and student and utilizing technology for information dissemination in the form of assignments, reports, feedbacks etc.

Monitoring the student activity becomes easy

Highly intuitive and interactive technologies

Advantages with Technology driven education
- Avishkar D Kamble [2013] Providing teachers a broad, flexible and responsive methodology to streamline their teaching and make it more meaningful, only Digital classrooms shall modernized it.
- Digital classrooms make learning more entertaining, interesting, easily graspable, understanding and enjoyable for students of the entire cadre.

Disadvantages with traditional education system
- Our education system unfortunately comes with the tag of traditional and is strictly a pen and paper system. In our society and the education system, practical knowledge has not been given the ample importance that it needs.
- Students’ focus is set in the wrong direction: in taking notes rather than understanding and absorbing new concepts which results in students’ inability to grasp key ideas and concepts and failed lesson objective.
- Traditional classroom training doesn’t encourage critical thinking skills, the ability to actively apply information gained through experience and reasoning.

Conclusion
With the introduction of Information and Communication Technologies into education spectrum, there is a paradigm shift in teacher’s teaching process and students learning process. Hence it is the need of the hour that government and educational institutions in India should move towards digitalization in education to hone the skills of the students because “Technology gives the quietest student a voice.”

References

About the Authors
Mrs. S. Durga Bhavani [Membership No. 11510391] is working as Asst Prof in Aditya Global Business School. Her area of work includes Business Information systems. Her Area of interests are Business Intelligence and Image Processing. She can be reached at sdbhavani390@gmail.com

Mr. K. Pavan Kumar is working as Asst Prof in Aditya Global Business School. His area of work includes Business Information systems. His Area of interests are Business Intelligence and HRIS. He can be reached at pavankumar545@gmail.com

Meeting of Hony Secretary and Hony Treasurer with Members of Bhubaneswar Chapter on 8th May 2017.
Hony Treasurer Mr. Manas Patnaik visited CSI Bhubaneswar Chapter and interacted with the members including Mr. R. N. Sarathy, Hony Secretary Mr. R. N. Behera, IPP regarding the various developmental plans and planning of the CSI activities in the state of Odisha. He also interacted about the status & functioning of the student branches in the state. Prof. Nayak & Mr. Patnaik advised the office bearers for planning to conduct at least one National & one International activity at Bhubaneswar in the year 2017. They also requested the members present in the meeting to make all efforts for achieving at least 25% of CSI membership growth in the state during the financial year 2017-2018.
Earlier prof. Nayak also addressed at the annual meeting of CSI student branch at Trident Group of Institutions.
CSI SIG IoT
In Collaboration with CSI-Hyderabad Chapter
Presents One Day National Workshop on
Deep Dive with Strategic IoT on 1st July, 2017

Time: 9.00 AM to 5.00 PM
Venue: Princeton Convention Center, Hyderabad

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➤ IOT - Architecture
➤ IOT - Communication Protocol
➤ Smart Farming Concept and realization with Indigenous IOT Technology

Module 2: IoT programming
➤ Python programming basic
➤ Python programming for IoT

Module 3: Build IoT using Raspberry Pi
➤ IOT: H/W Boards
➤ Architecture of Raspberry Pi Board
➤ Setting up Raspberry Pi Board to start the Work.
➤ Installing OS on your Raspberry Pi

Module 4: Design your IoT first project
➤ LED Blinking using IoT board
➤ LED Pattern Blinking using IoT board

Module 5: Design IoT project to do home automation
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Deep Dive with Strategic IoT on 1st July, 2017

Report of Review Meeting of CSI 2017 held on 09th May 2017 at Hotel Shivigan, Kolkata

Logo of CSI 2017 was selected and approved by all members unanimously.

Members Present:
1. Prof. A. K. Nayak, Secretary, CSI
2. Mr. Devaprasanna Sinha, RVP, Region II
3. Prof. J. K. Mandal, Chair, PC
4. Mr. Subir Lahiri, Co-Chair, OC
5. Mr. Aniruddha Nag, Chair, RC
6. Prof. D. D. Sinha, Co-Chair, PC
7. Dr. Phalguni Mukherjee, Chair, OC
8. Dr. Somnath Mukhopadhyay, RSC II
9. Mr. Subimal Kundu, Event Chair
10. Ms. Alakananda Rao, Chair, FC
11. Prof. A K Nayak, Hony Secretary, CSI welcomed all the chairs of CSI 2017 along with RVP-II & RSC Region II and proposed RVP II, to chair the Review Meeting which was seconded by Prof. J. K. Mandal, Chair, PC.

The meeting started with the welcome address of the Chairman. He welcomed all members for this Review Meeting of CSI 2017, 52nd Annual Convention of Computer Society of India, being held at Kolkata. Chairman thanked Prof. A K Nayak, Prof. J K Mandal and Dr. Somnath Mukhopadhyay, in particular, for organizing the meeting at a short notice at Kolkata. Chairman admitted the delay of organizing the identified tasks of CSI 2017, primarily because of election and other related issues. He suggested that more Chairs/Co-chairs of members of different committees would be identified and involved for smooth preparation of the event CSI 2017. Members unanimously decided that the event will be held from January 19 to 21, 2018 with the focal theme ‘Social Transformation – Digital Way’. The tutorial will be conducted on 18th January 2018.

Chairman informed that be J W Marriot Hotel may be, the main venue considered for the CSI 2017. It was decided that primarily OC Chair and PC Chair along with RVP-II will make a visit to the Hotel for initial discussions and bookings on the identified dates for CSI 2017 at the earliest. The OC Chair Dr. Phalguni Mukherjee presented the complete organisational details of the conference including the propose timing and venue of the tutorial and cultural programme. The PC chair Dr. J. K. Mandal highlighted regarding the programme structure, call for papers, publications, stationeries, website constructions etc. The FC chair has elaborated regarding the financial layout and mode of operations of this conference. Other prominent members present in the meeting also actively participated in the deliberations and all the required resolutions were taken unanimously.

Meeting was ended with vote of thanks to the Hony. Secretary.

www.csi-india.org
The First International Conference on "Computational Intelligence, Business Analytics, and Communication (CICBA-2017)" was organized by Calcutta Business School in association with Computer Society of India, on March 24-25, 2017 at Calcutta Business School campus. The conference was technically sponsored by IEEE Kolkata. The proceedings of the conference was published by Springer Nature, CCIS Series. It was the first international conference of Springer Nature in Eastern India under the MOU signed between CSI and Springer Nature. Union Bank of India was one of the sponsors of the Conference.

The conference was inaugurated by Mr. R S Jhawar, Director, Williamson and Major Group in the presence of Prof. (Dr.) L. M. Patnaik, IISc. Bangalore, Prof. (Dr.) Anirban Basu, President CSI, Prof. (Dr.) A K Nayek, Secretary CSI, Prof. (Dr.) Edward Tsang, University of Essex, UK, Dr. Gautam Mahapatra, Scientist-G, RCI Labs, DRDO Hyderabad, Mr. Lawrence Mohanraj, Country Lead – Academic Initiative, IBM India Pvt. Ltd, Chennai, Mr. Somnath Chatterjee, Vice President Capgemini, Kolkata, Padma Shri Prof. (Dr.) Sankar Pal, Former Director, ISI Kolkata, Prof. (Dr.) P. N Suganthan, NTU, Singapore, Prof. (Dr.) Sushmita Mitra, Machine Intelligence Unit, Indian Statistical Institute, Kolkata, Ajit Balakrishnan, Founder, Current Chairman and CEO, Rediff.com, Dr. Arindam Pal, Research Scientist, Data and Decision Sciences Group, TCS Innovation Labs Kolkata, India, Mr. Rajeev Ranjan Kumar, Program Manager, Virtual Desk, Wipro Tech. Hyderabad etc., were present there for the Keynote address, invited talk and Panel discussions.

The total number of 276 papers were received across the globe which includes countries like Australia, UK, Singapore, Bangladesh, Portugal, Saudi Arabia, Taiwan, Nepal, Thailand, Russia, USA and many more. 90 papers were accepted in the conference and presented. Apart from paper presenters many more delegates were present there to attend the conference. There were 8 tracks and 18 technical sessions in the conference where the authors presented their respective research work in front of the track chairs who were from academics and industries. The three best papers were given by Springer Nature for € 250, € 200 & € 150 respectively. Some other awards were also given by Calcutta Business School and IEEE Young Professionals Kolkata.

Prof. (Dr.) J. K. Mandal, University of Kalyani, Prof. (Dr.) Paramartha Dutta, Viswa Bharati University and Dr. Somnath Mukhopadhyay, Calcutta Business School, Prof. (Dr.) Tamal Dutta Chaudhuri were the Chairs of Program Committee and Organizing Committee of CICBA 2017.

Two Day Workshop on "Scientific Document Writing using LaTeX", February 11-12, 2017. Jointly Organised by Computer Society of India Kolkata Chapter and Aliah University at Dept. of Computer Science and Engineering, Aliah University, India

Interaction Program at B. Poddar Institute, Kolkata in the Department of Computer Science & Engineering for revival of CSI Student Chapter of the institute. All Faculty members of CSE & IT along with Dr-Somnath Mukhopadhyay, RSC, Region II, Mr. D. P. Sinha, RVP Region II, Mr S. Kundu, Fellow, CSI and Prof. Dr. Jyotsna Kumar Mandal, Hon. Chairman, CSI Kolkata Chapter on 10th September 2016.
First International Conference on Advanced Computational and Communication Paradigms-2017 (ICACCP-2017)

Organized by:
Department of Computer Science and Engineering, Sikkim Manipal Institute of Technology

Date: September 08-10, 2017 | Venue: Sikkim Manipal Institute of Technology

Selected extended papers will be published in the Special Issue on:
2. “Advanced Intelligent Computing and Communication Networks” - International Journal of Advanced Intelligence Paradigms (IJAIPI) (Scopus Indexed)

Call for Papers
Topics of the Conference (not limited to):
A. Advanced Computational Paradigms
B. Networking and Data Communications
C. Cyber Security and Data Forensics
D. Signal Processing
E. Computer Vision and Image Processing
F. Computational Intelligence
G. Adaptive Computation and Machine Learning
H. Industrial Applications

In addition, there will eight (08) special Tracks.
A. Computational Perception and Cognition
B. Human Computer Interaction
C. Remote Sensing and Geographical Information System
D. Big Data Analytics
E. Biomedical Engineering and Biotechnology
F. Social Networking
G. Material Science and Nano Technology
H. Applied Nonlinear Dynamics and Graph Theory

Selected extended papers will be published in Springer (Lecture Notes in Electrical Engineering (LNEE) and indexed in ISI Proceedings, EI-Compendex, SCOPUS, MetaPress, Springerlink)

Important Dates
Submission Deadline: 15th May, 2017
Extended Deadline: 15th June, 2017
Acceptance Notification: 1st August, 2017
Early Bird Registration: 15th August, 2017
Regular Registration: 31st August, 2017
Copyright and Camera Ready Submission: 31st August, 2017

Early Bird Registration Fees:
₹ 7000 (Academician) $350 (Foreign Delegates)
₹ 5000 (Students) ₹ 8000 (Industry Delegates)

*All IEEE, ACM and CSI Members will get 30% concessions on Regular Registration fees

Contacts: The Convener, ICACCP-2017, Department of Computer Science and Engineering, Sikkim Manipal Institute of Technology, Majitar, East Sikkim, Sikkim, India,
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Website: http://www.icaccp.in/ | http://www.icaccpa-smit.in/

Call for Paper for July Issue of the CSI Journal of Computing
(e-ISSN: 2277-7091)

Original Research Papers are invited for the CSI Journal of Computing, published on line quarterly (e-ISSN: 2277-7091) by the Computer Society of India (CSI). The contributions should be written in English and may be of theoretical or applied nature, the essential criteria are computational relevance and systematic foundation of results. The scope of the journal includes but not limited to dependable computing, parallel computing, services computing and cloud computing, green computing, internet computing, business process computing, software evolution and mining and network science, social networks, collective intelligence. The articles must be written in two columns format. The article should be typed, double-spaced on standard-sized (8.5" x 11") with 1" margins on all sides using 12 pt. Times New Roman font and 8-12 pages in length. The standard international policy regarding similarity with existing articles will be followed prior to publication of articles. Word version of the article is must for the processing of the journal. All submissions will be screened for plagiarism and when identified, the submissions by the same author will be rejected at any stage of the review process even after the publication of the paper online. The accumulated similarities should not exceed 10% from all additive sources and a maximum of 5% from single source. Names and Affiliations of the authors must NOT be included anywhere in the paper during the initial submission. For the peer review purpose, self-references are NOT permitted. If the author needs to refer his/her own paper the reference MUST be made in third person. Any attempt to reveal author details and affiliation at the time of initial submission will lead to rejection of the paper without further processing. Submission: Send your paper through the journal E-mail address: csi.journal@csi-india.org within 15th June 2017 for the July 2017 issue.
Netaji Subhas Institute of Technology (NSIT) located at Amhara, Bihta, Patna is a premier and prestigious private engineering institute in the state of Bihar. It is approved by AICTE as well as SBTE and is affiliated to Aryabhatt Knowledge University, Patna. It imparts 4 years B Tech courses in Computer Science, Electronics & Communication, Electrical & Electronics, Civil and Mechanical engineering branches.

NSIT got Institutional Membership (M 10329) of the Computer Society of India. The membership was granted for a period of two years from 01 Jan 2017 to 31 Dec 2018. In order to get students membership, a drive was taken by Deptt of Computer Science Engineering. As a result, 83 students of CSE and ECE got registered for the membership.

13 May 2017 was a red letter day in the institute’s history, when CSI Student Chapter was inaugurated by CSI National Secretary Prof. (Dr.) A K Nayak. Others present on the occasion were Dr. Prabhat Kumar, State Coordinator CSI & HoD CSE at NIT, Patna; Mr. S K Shrivastava, Technical Director, National Informatics Centre, Govt of India, Md. Shams Raza, Former Chairman CSI, Patna Chapter, Dr. Rajiv Mishra, Associate Professor in CSE at IIT Patna and Mr. J P Singh, Asst Prof NIT, Patna.

The function was started by lighting of lamp by the dignitaries present. The guests were welcomed by the NSIT Principal Dr. S B Singh by presenting bouquets. He also outlined the brief history and achievements of the institute. Mr. Gopal Krishna, Asst Prof NSIT, gave details as institute student coordinator.

The key note address was delivered by the chief guest, Prof A K Nayak. In his speech, Prof Nayak emphasized the importance of CSI membership and explained the benefits to its member students. He also promised to sponsor students for projects and organize guest lectures. The function was also addresses by other dignitaries present on the occasion.

The second session was dedicated to a State level Seminar on a very contemporary topic entitled “Digital India – A Road Map to Cashless Society”. The speakers on the subject were Mr. S K Shrivastava, Dr. Prabhat Kumar, Dr. Rajiv Mishra and Mr. J P Singh. Mr. Shrivastava during his talk highlighted the GoI initiatives to make digital India and gave the example of Bihar State Electricity Board for its on spot meter reading and revenue collection. Dr. Prabhat Kumar in his lecture presented the summary of a paper on the problems encountered in making India digital and discussed the probable solution. Dr. Rajiv Mishra discussed on e-wallet and the in-processes it undergoes. Mr. J P Singh explained the benefits of e-money transfer and in case of any problem its trouble-free irreversibility.

Dr. S B Singh presented the guests institute mementoes. The student members were presented participation certificates. Mrs Soni Sweta, HOD, CSE, NSIT proposed vote of thanks. All the faculties of CSE and ECE actively participated to make this function a grand success. Few notable among them are Mrs Reema Dhar, HoD ECE, Mr. Amrutanshu Panigjari, Mr. Triloki Nath, Mr. S C Pandit and Mr. Aditya Shekhar, TPO.
CrossWord

Durgesh Kumar Mishra
Chairman, CSI Division IV Communications
Professor (CSE) and Director Microsoft Innovation Center, Sri Aurobindo Institute of Technology, Indore. Email – drdurgeshmishra@gmail.com

Test your knowledge on ICT IN EDUCATION

Solution to the crossword with name of first all correct solution provider[s] will appear in the next issue. Send your answer to CSI Communications at email address csic@csi-india.org and cc to drdurgeshmishra@gmail.com with subject: Crossword Solution – CSIC June 2017 Issue.

We are overwhelmed by the response and solutions received from our enthusiastic readers

Congratulations!

All nearby Correct answers to May 2017 month’s crossword received from the following reader:

• A. Vanathi, Asso. Prof., CSE, Aditya Engineering College, Kakinada, Andhra Pradesh
• Ms. Priyanshu Jadon, M.Tech., Sri Vishnav Vidhya Peeth, Indore
• Aruna Devi, Surabhi Softwares, Mysore. Hon. Secretary, CSI Mysore Chapter
• P. Ganga Bhavani, Asso. Prof. CSE, Chirala Engg. College, Chirala, Andhra Pradesh
AHMEDABAD CHAPTER

The Chapter organized a public event on “World Telecommunication and Information Society Day-2017 with theme - Big Data for Big Impact” on 17th May 2017 in joint association with Institute of Engineers India-Ahmedabad and The Institution of Electronics and Telecommunication Engineers- Ahmedabad. The event was also supported by Association of Computing Machinery, Ahmedabad Chapter, Gujarat Innovation Society and Broadcast Engineering Society-Ahmedabad Chapter. The objective of the event is to spread awareness about current trends in the telecommunication sector. Currently, the telecommunication sector is going through a huge revolution and big data has significant impact on it. Dr. Pradeep Kumar Hota, ITS, Chief General Manager, Gujarat Telecom Circle was the Chief Guest. His insightful presentation with factual statistics was interesting and noteworthy for professionals working in the telecommunication area. Mr. Manish Soota, Vice-President, Cignex Datamatics and Mr. Vijay Shah, Head Marketing India, Apttus discussed the current trends, issues and challenges and the opportunity for computer professionals. They have also discussed the content/data being generated through social media which is highly unstructured and transforming into meaningful information. Mr. Bharat Patel, Convener of the event and Dr. Sandeep Vasant, Chairman, CSI Ahmedabad Chapter addressed the audience and introduced the various speakers. There were more than 150+ participants. The event was concluded with interesting Q&A sessions and was followed by dinner.

HARIDWAR CHAPTER

The Chapter conducted the FDP on Latex on 2nd May 2017 in CSE Lab at FET, GKV. As Latex is a very useful tool for researchers, this FDP was very fruitful to all. There were total 34 participants including Teachers and Research Scholars.

JALANDHAR CHAPTER

CSI Jalandhar chapter conducted its first coding event – Techno Crackers: Let’s Codify on 13 May 2017. The program was inaugurated by the Chief Guest, Prof. L.K. Awasthi, Director, NIT Jalandhar, and briefed the participants about the recent trends in Information Technology. He further enlightened the participants about the importance of platform independent and language independent coding practices along with focus on writing an optimized code. Head of the Department Computer Science and Engineering, Dr. Geeta Sikka, illustrated the concept of optimized coding techniques which can help students to design and code efficient software. Faculty members from CSE Dr. Renu Dhir, Dr. Harsh Verma, Mr. D.K. Gupta, Mr. Ashish Kumar, Mr. Ranjeet Kumar, Mr. Akash Punhani and others organized the event. A good number of students from various Institutes participated in the state level event that comprised of two competitions: ICT Quiz and coding and debugging. Amolak Bahri, Karan Mohindroo and Radhamohan Sharma secured the 1st, 2nd and 3rd positions respectively in ICT Quiz, whereas Karan Mohindroo, Dhannanjai and Rijul Dhir bagged the top three positions respectively.

TIRUCHIRAPPALLI CHAPTER

CSI Tiruchirappalli Chapter has conducted the guest lecture on ROBOTICS—FUTURE WORLD on 9th May 2017. Er. Joshua Arul Kumar, Associate Professor, MAM College of Engineering, Trichy was the speaker for the event.
<table>
<thead>
<tr>
<th>REGION-I</th>
<th>REGION-II</th>
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<tbody>
<tr>
<td>Dronacharya College of Engineering, Gurgaon</td>
<td>B P Poddar Institute of Management &amp; Technology, Kolkata</td>
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<tr>
<th>REGION-III</th>
<th>REGION-V</th>
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<tbody>
<tr>
<td>Sagar Institute of Science and Technology(SISTec), Bhopal</td>
<td>Vasireddy Venkatadri Institute of Technology, Guntur</td>
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<tr>
<td>2-5-2017 - Expert Lecture by Mr. Pradeep Gupta</td>
<td>24-4-2017 to 6-5-2017 - Two Week workshop on Android Fundamentals</td>
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<th>REGION-III</th>
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<tr>
<td>Jaypee University of Engineering &amp; Technology, Guna</td>
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<tr>
<td>27-3-2017 to 29-3-2017 - Three Day event on a Byte of Data Structures</td>
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<td>22-4-2017 &amp; 23-4-2017 – Two Day event OBLIVION RELOADED</td>
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<tr>
<td>G H Patel College of Engg. &amp; Tech., Vallabh Vidyanagar</td>
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<tr>
<td>22-4-2017 &amp; 23-4-2017 - Technical programming contest CODEVIE++2017</td>
<td>24-4-2017 to 6-5-2017 - Two Week workshop on Android Fundamentals</td>
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<tr>
<td>Date</td>
<td>Event Description</td>
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<tr>
<td>25-4-17</td>
<td>Guest Lecture on upcoming Technologies and its job related opportunities by Ms. Roopa, IIHT</td>
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<tr>
<td>9-5-2017</td>
<td>National University level CodeFest-2017 (NUCF-17)</td>
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<tr>
<td>11-5-2017</td>
<td>Technical Talk on Software Deve. Life Cycle by Smt Bhanumathi, Past Chairperson, CSI Bangalore Chapter</td>
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<tr>
<td>5-5-2017 &amp; 6-5-2017</td>
<td>Dr. Prakash, Past Chairman, CSI Bangalore Chapter inaugurated the two days National Level Project Symposium and Technical Fest</td>
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<tr>
<td>18-4-2017</td>
<td>Dr. R Srinivasan, Fellow &amp; Past President, CSI inaugurated the 5th Anniversary celebrations</td>
</tr>
<tr>
<td>22-4-2017</td>
<td>Technical Talk on Project Development Life Cycle by Mr Nischalananda, Infosys</td>
</tr>
<tr>
<td>20-4-2017 &amp; 21-4-2017</td>
<td>Dr. Anirban Basu, Immediate Past President inaugurated the 5th International Conference on Pervasive Computing and Networking (ICPCN)</td>
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**From Student Branches**

**REGION-V**

**K S Institute of Technology, Bangalore**

**REVA University, Bengaluru**


**GSSS Institute of Engg. and Technology for Women, Mysuru**

11-5-2017 - National University level CodeFest-2017 (NUCF-17)

18-4-2017 - Dr. R Srinivasan, Fellow & Past President, CSI inaugurated the 5th Anniversary celebrations

22-4-2017 - Technical Talk on Project Development Life Cycle by Mr Nischalananda, Infosys

20-4-2017 & 21-4-2017 – Dr. Anirban Basu, Immediate Past President inaugurated the 5th International Conference on Pervasive Computing and Networking (ICPCN)
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<tr>
<th>Region</th>
<th>Activity Details</th>
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</table>
| VI     | Pillai HOC College of Engg. and Technology, Rasayani: 11-3-2017 - One day workshop on JSP, JQuery and JavaScript.  
|        | Universal College of Engineering, Mumbai: 30-3-2017 - Workshop on IOT (Internet of Things). |
|        | Jeppiaar Institute of Technology, Sriperumpudur: 21-4-2017 - Guest Lecture on Software Engineering by Ms Priya from Accenture, Chennai. |
|        | Hindustan Institute of Technology and Science, Chennai: 27-4-2017 - Mr H R Mohan, Past President, CSI Inaugurated the Project Design Competition.  
|        | 31-3-2017 – Winners at Inter College Coding Competition. |

Student branches are requested to send their report to sb-activities@csi-india.org with a copy to admn.officer@csi-india.org.  
Chapters are requested to send their activity report to chapter-activities@csi-india.org with a copy to admn.officer@csi-india.org.  
Kindly send high resolution photograph with the report.
CSI Calendar 2016-17

Gautam Mahapatra, Vice President, CSI, Email: vp@csi-india.org

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Details &amp; Contact Information</th>
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<tr>
<td><strong>MAY</strong></td>
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<td><strong>JUNE</strong></td>
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<tr>
<td>05-30, 2017</td>
<td>Workshop on LAMP (Linux, Apache, MySQL, Perl / Python), Jaypee University of Engineering and Technology, Raghogarh, Guna - MP. <a href="http://www.juet.ac.in">www.juet.ac.in</a> Dr. Shishir Kumar (<a href="mailto:dr.shishir@yahoo.com">dr.shishir@yahoo.com</a>) 9479772915</td>
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<tr>
<td><strong>JULY</strong></td>
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<tr>
<td>20-22, 2017</td>
<td>IEEE International Conference on Networks &amp; Advances in Computational Technologies (NetACT 2017), organized by CSI Trivandrum chapter <a href="http://netact17.in/">http://netact17.in/</a> Contact: <a href="mailto:netact17@gmail.com">netact17@gmail.com</a> IEEE International Conference on Networks &amp; Advances in Computational Technologies (NetACT 2017) organized by CSI Trivandrum chapter <a href="http://netact17.in/">http://netact17.in/</a> Contact: <a href="mailto:netact17@gmail.com">netact17@gmail.com</a></td>
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<tr>
<td><strong>OCTOBER</strong></td>
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<td>28-29, 2017</td>
<td>International conference on Data Engineering and Applications-2017 (IDEA-17) at Bhopal [M.P.], <a href="http://www.ideaconference.in">http://www.ideaconference.in</a> Contact : <a href="mailto:conferenceidea@gmail.com">conferenceidea@gmail.com</a></td>
</tr>
<tr>
<td><strong>DECEMBER</strong></td>
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<tr>
<td>21-23, 2017</td>
<td>Fourth International Conference on Image Information Processing (ICIIP-2017), at Jaypee University of Information Technology (JUIT), Solan, India, (<a href="http://www.juit.ac.in/iciip_2017/">http://www.juit.ac.in/iciip_2017/</a>) Contact: Dr. P. K. Gupta (<a href="mailto:pkgupta@ieee.org">pkgupta@ieee.org</a>) (O) +91-1792-239341 Prof. Vipin Tyagi (<a href="mailto:dr.vipin.tyagi@gmail.com">dr.vipin.tyagi@gmail.com</a>)</td>
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Kind Attention:
Prospective Contributors of CSI Communications

Please note that Cover Theme for July 2017 issue is *Internet of Everything (IoE)*. Articles may be submitted in the categories such as: Cover Story, Research Front, Technical Trends, Security Corner and Article. Please send your contributions by 20th June, 2017.

The articles should be authored in as original text. Plagiarism is strictly prohibited.

Please note that CSI Communications is a magazine for members at large and not a research journal for publishing full-fledged research papers. Therefore, we expect articles written at the level of general audience of varied member categories. Equations and mathematical expressions within articles are not recommended and, if absolutely necessary, should be minimum. Include a brief biography of four to six lines, indicating CSI Membership no., for each author with high resolution author photograph.

Please send your article in MS-Word format to to Editor, Prof. Prashant R. Nair in the email ids csic@csi-india.org with cc to prashant@amrita.edu

[Issued on the behalf of Editorial Board CSI Communications]

Dr. S S Agrawal
Chief Editor
Call for Proposals from CSI Student Branches to organize

National / Regional / State Level
CSI Student Conventions
during the year 2017-18

Computer Society of India (CSI) organizes National, Regional, and State Level Student Conventions annually, to enhance the awareness on technological developments and applications, and foster creative professional orientations among the academic community. The Conventions, held at Student Branches, offer excellent opportunities to the students to manifest their technical proficiency and prowess through paper presentations, discussions and extensive interactions with peers and pioneers.

CSI invites Proposals from Student Branches to conduct the National/Regional/State Level Student Conventions to be held during the academic year 2017-18 (April to March).

Criteria: The proposing Student Branch should be very active, with a track record of several CSI activities, and be in good standing through the years 2016-17 and 2017-18.

The proposals for convention will be evaluated, broadly based on the parameters given below:

a) Number of years of continuous valid Student Branch at the college (without break)
b) Average student strength over the past three years
c) Number, quality and level of activities at the student branch
d) Prompt submission of activity reports and financial accounts
e) Ability to attract good speakers from Industry
f) Availability of infrastructure and other resources
g) Financial strength and potential
h) Accessibility and other general conditions

Schedule:
Regional & State Student Conventions: To be conducted before 31st December 2017
National Student Convention: To be conducted after 1st January 2018 before 28th February 2018

All the National, Regional & State Student Conventions are to be completed according to the above schedule.

The CSI Student Convention Manual available at [Please see http://www.csi-india.org/convention.aspx] describes the guidelines and norms to conduct the student conventions.

The Proposal: Interested Student Branches are requested to send electronic proposals in the prescribed format with all necessary data, including the information stated below.

a) Type of convention proposed: National/Regional/State level
b) Proposed dates (at least two days) – please indicate two sets of dates
c) A statement of case why the SB should be considered favourably for the proposed event
d) Signed undertaking by the Head of the Institution to provide all the required support (Document with scanned signature)
e) Name & contact details of SBC and the coordinator-designate for the proposed convention

How to send: The Student Branches may send the proposals in the prescribed format on or before July 20, 2017 through the respective Regional Vice President, to the Hon Secretary [secretary@csi-india.org] and Vice President [vp@csi-india.org], with a copy to Education Directorate [admn.officer@csi-india.org]

Selection: A Committee constituted by CSI, including the Honorary Secretary and Vice President, will assess the proposals to select the host institutions.

CSI Support: CSI extends partial financial assistance, in accordance with the availability of budgetary resources, subject to the approval of the Executive Committee. CSI also supports the publicity efforts for the Conventions.

Convention Helpline: CSI-Education Directorate shall be pleased to offer any information or help on the convention. Please do contact Mr. Gnanasekaran [email: admn.officer@csi-india.org] Mobile: 98403 41902 for any assistance.